Investing in the Future of Jobs and Skills

Scenarios, implications and options in anticipation of future skills and knowledge needs

Sector Report
Furniture

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Eurofound

Submitted to the European Commission, DG Employment, Social Affairs and Equal Opportunities

Executed by:

TNO Netherlands Organisation for Applied Scientific Research

SEOR Erasmus University Rotterdam

ZSI Centre for Social Innovation

May 2009

DG EMPL project VC/2007/0866

Lot 9, Furniture

This report is published as part of a series of forward-looking sector studies on New Skills and New Jobs in the frame of the project *Comprehensive Sectoral Analysis of Emerging Competences and Economic Activities in the European Union.*

This publication is commissioned under the European Community Programme for Employment and Social Solidarity - PROGRESS (2007-2013).

This programme is managed by the Directorate-General for Employment, social affairs and equal opportunities of the European Commission. It was established to financially support the implementation of the objectives of the European Union in the employment and social affairs area, as set out in the Social Agenda, and thereby contribute to the achievement of the Lisbon Strategy goals in these fields.

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Preface

This report presents the final results of the study *Comprehensive analysis of emerging competences and economic activities in the European Union in the Furniture sector*. The report is part of a series of sixteen future-oriented sector studies on innovation, skills and jobs under the same heading, commissioned by the European Commission (DG Employment, Social Affairs and Equal Opportunities). Eleven of these studies were executed by a core consortium led by TNO (Netherlands Organization for Applied Scientific Research) and consisting of TNO Innovation Policy group (Leiden, the Netherlands), TNO Labour (Hoofddorp, the Netherlands), TNO Innovation and Environment (Delft, the Netherlands, SEOR Erasmus University (Rotterdam, the Netherlands) and ZSI (Centre for Social Innovation, Vienna, Austria). The core consortium was in charge of the overall management of the study, the further elaboration and application of the overall approach and methodology, as well as data collection and analysis. This study on future skills and jobs in the furniture sector has been executed by core team staff (see annex 1 for team composition). We thank also Mrs Maria José Llaudes (AIDEMA) who joined the core team and contributed to part I of the study.

The study was carried out during the period January 2008-April 2009. Stakeholders in the sector, including the European sectoral partners and representatives of various other organisations, have been involved in various ways and forms throughout the study. This included a sectoral kick-off meeting at the start of the study and three multisectoral stakeholder meetings in Brussels during which intermediate results of the studies were presented and discussed. Valuable workshop discussions in the frame of the project were held and inputs received from a number of experts. Apart from multiple inspiring consortium ('internal') workshops, two main 'external' workshops were held. A draft final version of this report was validated and complemented during a second external, final workshop in Brussels on 22 and 23 January 2009. The final workshop brought together an apt mixture of different European and national sector experts representing the industry, European social partners, other various representative organizations, academia as well as the European Commission (see Annex 2 for a full list of participants). The workshop, which formed an explicit and integral part of the methodological approach, yielded a number of helpful comments and insights which have been used in further finalising the study. We express our sincere gratitude to all workshop participants and to all those that contributed to this study.

A special word of thanks holds for the European Commission, notably Jean-François Lebrun and Manuel Hubert, and Radek Owczarzak of the European Foundation for the Improvement of Living and Working Conditions who proved to be excellent guides during the project.

Delft, 1 May 2009

Dr Frans A. van der Zee (overall project leader)

1 General introduction

This report presents the final results of the study *Comprehensive analysis of emerging competences and economic activities in the European Union in the furniture sector*. The report is part of a series of sixteen future-oriented sector studies on innovation, skills and jobs under the same heading, commissioned by the European Commission (DG Employment, Social Affairs and Equal Opportunities). The study was executed by a consortium led by TNO (Netherlands Organization for Applied Scientific Research) and consisting of TNO, SEOR – a consultancy of Erasmus University (Rotterdam, the Netherlands) and ZSI (Centre for Social Innovation, Vienna, Austria). The study was carried out during the period January 2008-April 2009.

While the main focus of the study is on the future of skills and jobs by 2020, the study is both backward- and forward-looking in nature. It analyses recent relevant sector developments and trends and, at the same time, depicts the current state of play in the sector with an emphasis on innovation, skills and jobs. Current trends and developments form the stepping stone and fundament for the second and third future-oriented part of the study which is scenario-based, forward-looking and exploratory in nature.

Background and context

The study should be placed against the background of the EU's renewed Lisbon strategy in which securing and improving EU competitiveness and redeploying the European economy to new activities with more value-added and new and better jobs are key. In the process of change and restructuring to adapt to new realities, there is a need for a more strategic management of human resources, encouraging a more dynamic and future-oriented interaction between labour supply and demand. Without there is the risk that bigger shortages, gaps and mismatches of skills will result not only in structural unemployment but also hamper longer-term competitiveness.

Skills and jobs are of vital importance for the future of the European economy and have recently gained increasing attention, both at national and EU level. As stressed by the European Council in March 2008, investing in people and modernising labour markets is one of the four priority areas of the Lisbon Strategy for Growth and Jobs. The New Skills for New Jobs initiative launched in December 2008 (European Commission, 2008) elaborates on how this could best be done. The initiative aims to enhance human capital and promote employability by upgrading skills, as well as to ensure a better match between the supply of skills and labour market demand. More transparent information on labour market trends and skills requirements, but also the removal of obstacles to the free movement of workers in the EU, including administrative barriers would help achieve this goal, and improve occupational, sector and geographical mobility. The initiative also stresses the need to improve the Union's capacity for skills assessment (by improved monitoring and forecasting), anticipation (by better orientating skills development) and matching with existing vacancies. The current financial and economic crisis makes these challenges even more pressing. Further strengthening the economic resilience and flexibility of the European economy and its Member States calls, along with other measures, for support of employment and further facilitation of labour market transitions (European Commission, 2008a:10).

Approach and methodology

The study takes a longer term future perspective, and looks ahead to 2020, but also back, and takes a highly aggregated European perspective. While it is fully acknowledged that more detailed Member State and regional analyses are important and vitally important for anticipating future skills and knowledge needs, the European perspective has been central in this analysis. Key to the study and a common point of departure was the use of a pre-defined methodological framework on innovation, skills and jobs (Rodrigues, 2007). During the course of this study this framework has been further developed, operationalised and applied to the sector. The approach combined desk research and expert knowledge available in a broad and dedicated research team with the knowledge and expertise of 'external' sector experts. The purpose of this *common uniform methodology* is to deliver results that enable comparisons across and between sectors and hence enable the preparation of possible future actions to investigate the topic of new future jobs and skills for Europe, by encouraging a more effective interaction between innovation, skills development and jobs creation. The methodology is structured along various steps, each step providing inputs and insights for next steps to come. Overall, the methodology covers the following steps:

Step 1. Identification of economic activities to be considered (i.e. sector selection)

Step 2. Main economic and employment trends and structures by sector

Step 3. Main drivers of change

Step 4. Main scenarios

Step 5. Main implications for employment – changes by job function

Step 6. Main implications for skills – emerging needs by job function

Step 7. Main strategic choices to meet future skills and knowledge needs

Step 8. Main implications for education and training

Step 9. Main recommendations

Step 10. Final Workshop.

Further and next steps

The results of this study – along with 15 other sector studies using the same approach and being released at the same time - will serve as a guide in launching further EU-led but also other actions, by industry, sectoral partners, education and training institutes and others. One important aim of the study is to promote the strategic management of human resources and to foster stronger synergies between innovation, skills and jobs in the sector in the medium and longer run, taking into account the global context and encouraging adaptations to national and regional specificities. A very important element in further enabling and facilitating these goals is sound and continuous monitoring together with a uniform and consistent way of analysing future skills and knowledge needs for the various decision-making levels involved. The approach taken in this study aims to provide a broader framework that does exactly this. Further dissemination and explanation of the methodology at the Member State, regional and local level are therefore vital in the follow-up of this EU level study, as is its actual take-up. The results of the study include implications, conclusions and recommendations to anticipate future skills and knowledge needs. It does not in any way, however, assess or evaluate current or planned policies. Conclusions and recommendations may therefore coincide but may also oppose current policies and/or policy plans at the EU, national or regional level. The

implications, conclusions and recommendations logically follow from scenarios – credible plausible sector futures – meant to better structure and anticipate possible future developments.

Looking ahead in times of crisis

Even though the year 2020 may currently seem far off for most of us, the future will announce itself earlier than we think. In times of financial and economic crisis there is a logical tendency to focus on the now and tomorrow; withstanding and surviving the crisis are prime. Nevertheless, at the same time the medium and longer term ask for adequate attention. In this current age of continuing and pervasive globalisation, strong technological change and innovation affecting production and consumption around the globe, timely preparations to be able meet future skills and job needs are called for more than ever before. This is even more true in the face of an ageing European society and ditto workforce.

Contents in three parts

The report consists of three main parts. Part I analyses recent relevant sector developments and trends and depicts the current state of play in the sector, with an emphasis on innovation, skills and jobs. The findings of Part I of the report combine original data analysis using Eurostat structural business statistics and labour force survey data with results from an extensive literature review of relevant already existing studies. While giving a clear and concise overview of the most important trends and developments, the prime function of Part I is to provide the fundaments and building blocks for Part II of the study. The findings of Part I are based on the present and the recent past. The second part of the report is future-oriented and looks at sectoral developments and more specifically developments in skills and jobs in and towards 2020. The core of part II consists of plausible future scenarios and their implications for jobs, skills and knowledge. These implications have been analysed for various job functions. In a final third part, a range of main strategic options ('choices') to meet the future skills and knowledge needs is reviewed, including implications for education and training. The study concludes with a number of recommendations for the sector (individual firms, sector organizations, sectoral partners), education and training institutes and intermediary organisations, and last but not least, policy-makers at various levels, ranging from the EU to the local level.

Part I

Trends, Developments and State-of-Play

Part I. Trends, Developments and State-of-Play

Guide to the reader

Part I presents the results of steps 1, 2 and 3 of the common methodology applied to the chemicals sector broadly defined. Step 1 delineates and defines the sector. Step 2 starts with a mapping exercise, covering the main economic and employment trends and changes in structure of activities and a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. Step 3 analyses the main drivers of change of relevance for the sector based on a meta-driver approach and expert opinion. Part I of the report consists of 8 chapters. Chapter 2 provides a definition of the sector. Chapter 3 presents an overview of the structural characteristics of the sector, including developments and trends in employment, production and value added. It contains information on work organisation (part-time/full-time, gender, age), and industrial relations, but also on emergent trends by function. It also addresses existing partnerships for innovation, skills and jobs, one of the possible policy instruments to better prepare for and adapt to the future, facilitate mutual learning and boost innovative capacity both at the sector and firm level. While not part of the methodology as such, partnerships form an interesting example of how the development of skills and jobs can be linked to innovation. Chapter 4 discusses the value chain (network) and its evolution over time, including issues of restructuring and relocation. Chapter 5 focuses on innovation, R&D and technological change, while chapter 6 analyses the impact of globalisation and trade on and for the sector. Chapter 7 highlights the importance of regulation especially in relation to employment. Chapter 8 provides the results of a SWOT analysis of the sector. Chapter 9 concludes with an overview of the most important drivers for the sector.

2 Defining the sector

The statistical sector aggregate Furniture and Other Industries (short Others) which is ranked as NACE code 36 represents a number of traditional manufacturing industries including, most importantly the furniture sector (NACE 361), but also jewellery (362), musical instruments (363), sports goods (364), games and toys (365), and miscellaneous manufacturing industries (366) repair and installation of machinery and equipment. The dominant sector in terms of employment and value added is furniture, representing three-fourth of total employment. The distant second is jewellery with only 6% of total employment. We therefore devote the bulk of attention to the furniture sector and some attention to the jewellery sector. The latter is done in a specially dedicated part at the very end of this report.

According to the NACE classification, the furniture sector includes the following subsectors: chairs and seats; office and shop furniture; kitchen furniture; other furniture (home and garden furniture); and mattresses. There are no significant changes in the sector definitions in this sector between the NACE Rev 1.1 and the most recent Rev 2 classification (in operation since 2008).

Table 2.1 presents an overview of the furniture subsectors and the number of firms. In 2004, in the EU-25 the total number of firms in the furniture industry amounted to 143,840, with most firms in the "other furniture" sector, which according to IFM, can be described as home and garden furniture. Italy, Spain, France, Poland and Germany together represent 64 % of the total number of furniture firms in the EU-27.

Table 2.1 Number of companies in different furniture subsectors in the EU-25, 2004

NACE Rev 1.1.	Total number of companies (thousands)
36.11 Chairs and seats	25.1
36.12Office shop furniture	14.8
36.13 Kitchen furniture	12.1
36.14 Other furniture (home and garden furniture)	89.5
36.15 Mattresses	2.3
36.1 Total furniture	143.8

Source: IFM 2007:1.

The total production in 2005 of furniture in EU-2007 amounted to EUR 114.9 billion (bn), while the total value added in the same year amounted to EUR 35.5 bn. The total turnover was EUR 119.1 billion, which was 5.1 % higher compared to 2000 in nominal terms. The average firm in the furniture industry has a production of EUR 0.8 million (m) per year, compared to the EU manufacturing average of EUR 2.5 m.

3 Structural characteristics of the sector: past and the present

3.1 Production, value-added, and employment trends in the EU

Value added and production[1]

The overall value added in furniture and other industries (defined as NACE 36) grew with a modest 1.2 per cent annually over the years 1995-2006; GDP of the overall EU 27 economy grew with 2.3 per cent which is almost double (see Table 3.1). Growth in the furniture and other industries aggregate can be typified as quite sluggish. In the original EU 6, value added even declined with 0.4 per cent each year. The sector developed strongly in the new Member States (NMS) with a growth of 9.5 per cent each year, three times as much as the growth of the overall NMS economy (3.2 per cent). Top performers were Lithuania, Slovakia, Poland, and Estonia.

The sector lost ground in Germany, Greece, Luxembourg, Denmark, Italy and Belgium, with overall performance showing a more pronounced negative trend in the period 2000-2006 compared to 1995-2000. In some Member States, notably France, the sector grew somewhat stronger than the overall economyThe sector also gained ground in Austria, Ireland and Spain, with growth figures being higher than the overall economy. In the new Member States, growth numbers are high, but absolute numbers are low: they started from a low base.

Almost half of the 2006 value added in the furniture and other industries was produced by three countries – Italy (€11,951 million, or 16%), Germany (€ 11,425 m) and the UK (€10,128 m). Adding Spain and France brings the total share to 70%. Similar shares applied to turnover (output) (see Figure 2.1). From 1995-06, output grew in the new Member States and declined in the EU 6. The best performing countries were Lithuania (39.8% growth), Slovakia (18.1%), Poland (12.1%) and Estonia (12.%). The highest specialization (as defined by the concentration index, see explanation in the glossary) was in the new Member States. Lithuania had the highest index within the EU, followed by Estonia and Slovenia. If we take a look at the concentration index (see Table 2.2), this pattern is similar: a decline in the EU 6, and a strong increase in the new Member States. Especially in Germany the sector lost ground, with the concentration index from 109 in 1995 to 79 in 2006. Here comparative advantage has actually changed into a disadvantage. Spain, a country with a substantial furniture industry, developed a comparative advantage over the same period, as witnessed by the steep rise of the concentration index. All Central and Eastern European Member States increased their specialization in the furniture sector. The majority of them – the Czech Republic, Estonia, Lithuania, Poland, and Slovenia – already had the specialisation in the base period shown by a concentration index larger than 100 (yet not shown in the table). Overall, production shifted from Western to Eastern Europe, as expressed by the share of output.

[1] For each of the three variables employment, value added and trade it has been determined whether and in which countries the sector is winning, losing momentum, upcoming, or retreating, except for work organisation and occupational structure. For these variables, the country grouping is similar and in accordance with the country grouping classification under employment (as measured at the same NACE digit code).

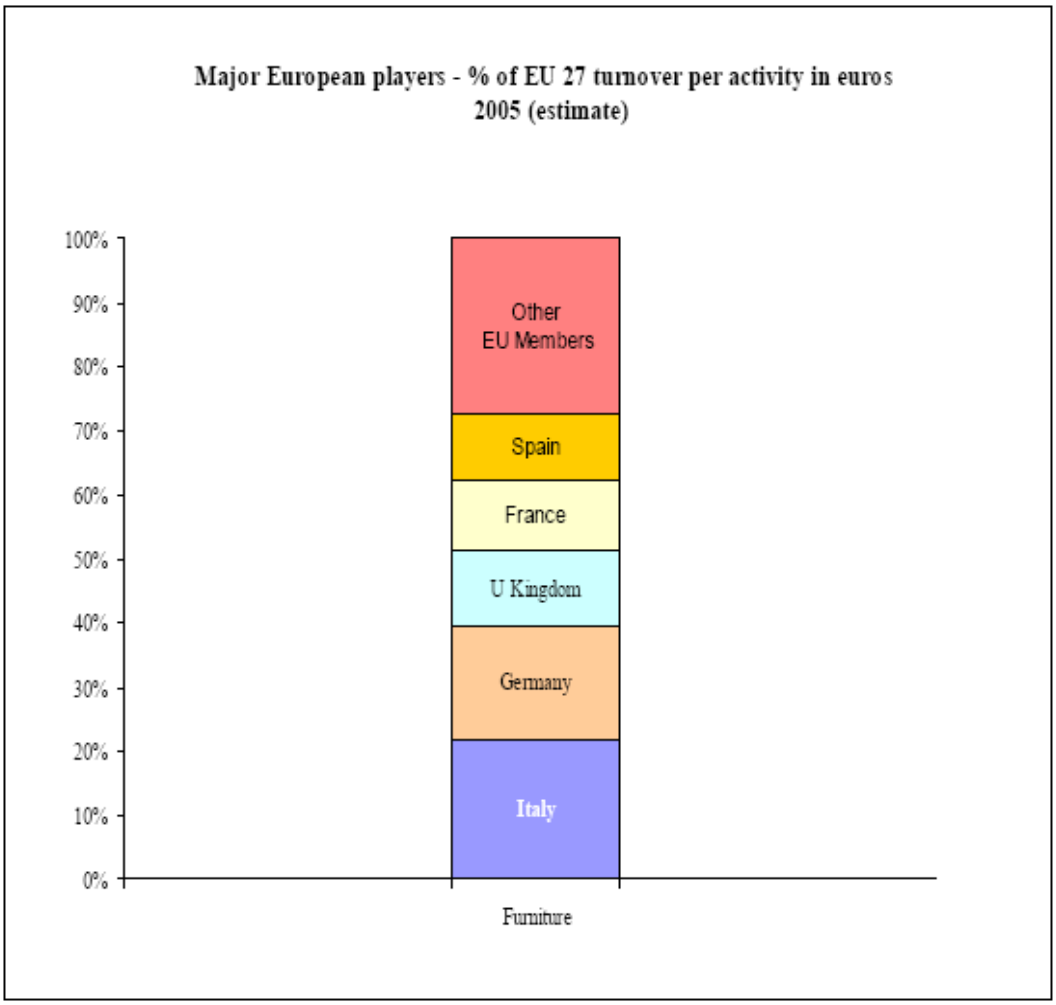
Table 3.1 Value added furniture and other industries by country grouping, 1995-2006

	Furniture and other industries				Overall economy			
	Level	**95-00**	**00-06**	**95-06**	**Level**	**95-00**	**00-06**	**95-06**
EU	72 866	2.5	0.1	1.2	11 468 970	2.8	2.0	2.3
EU-15	67 328	2.2	-0.4	0.8	10 883 245	2.8	1.9	2.3
NMS	5 539	10.4	8.9	9.5	585 725	2.7	3.7	3.2
Winning	24 622	6.2	4.0	5.0	2 558 904	4.0	2.8	3.3
Losing momentum	13 590	-0.5	-0.3	-0.4	1 700 076	1.7	0.9	1.3
Upcoming	10 320	7.3	-0.3	3.1	2 243 057	2.5	2.1	2.3
Retreating	24 321	0.4	-2.6	-1.3	4 933 080	2.7	1.8	2.2
	Value added bn euro 2006	Annual average growth 1995-2000	Annual average growth 2000-2006	Annual average growth 1995-2006	Value added bn euro 2006	Annual average growth 1995-2000	Annual average growth 2000-2006	Annual average growth 1995-2006

	Concentration >100	Concentration <100
Growth	**Winning**:	**Upcoming**:
	Netherlands, Austria, Ireland, Portugal, Spain, Czech Republic, Estonia, Lithuania, Poland, Slovenia	France, Sweden, Hungary, Slovakia
Decline	**Losing momentum**:	**Retreating**:
	Italy, Denmark	Belgium, Germany, Finland, Greece, United Kingdom

Source: Eurostat/TNO

Figure 3.1: Major players in furniture production in Europe



Source: IFM 2007

Employment

Total employment (see Table 3.2) for the sector aggregate Furniture and other industries amounted to 2,007,000 persons in 2006. Almost three-forth of employment (1,461,000) was concentrated in the furniture sector. The jewellery sector accounted for 6% of total employment (127,000); miscellaneous manufacturing industries (NACE 366), ranking third in size, accounted for 14% (280,000). More detailed numbers at EU and country levels are presented in Table 3.3. Two-third of employment in furniture is still in the 'old' Member States, with Germany being ranked first with 480,000 persons, followed by Poland (184,000), Italy (218,000), and Spain (149,000). Of the new Member States, Poland takes the lead with 184,000 persons, followed by Romania (98,000) and the Czech Republic (64,000). Growth was especially strong in the new Member States, both for the aggregate Furniture and other industries and for all of its constituent sub-sectors. This growth was based predominantly on labour cost advantages. Employment decreased in the EU-15, both for the aggregate (NACE 36) and for the furniture and jewellery sectors as such. In Italy and Spain, employment grew somewhat; Sweden is an interesting case with strong employment growth, yet marked as retreating in terms of concentration index. Overall speaking, employment in the sector shifted gradually but consistently from Western to Central and Eastern Europe over the last decade.

Table 3.2 Employment in furniture (NACE 361), 2000-2006

	Level 2006	Annual growth	Share in EU	Change in share
EU	1 461 206	0.2	100	0
EU-15	981 645	-1.4	67	-7
NMS	479 561	4.2	33	7
Winning	711 602	3.5	49	8
Losing momentum	216 556	-1.8	15	-2
Upcoming	36 791	3.8	3	0
Retreating	496 257	-2.9	34	-7

	Definition	Level (*1000) 2006	Average annual growth (%) 2000-2006	Share in EU employment sector (%) 2006	Change in share in EU employment sector (%) 2000-2006
Growth	Concentration >100 ***Winning:*** Italy, Spain, Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Poland, Slovakia				Concentration <100 ***Upcoming:*** Ireland, Hungary
Decline	***Losing momentum:*** Denmark, Austria, Portugal, Romania, Slovenia				***Retreating:*** Belgium, Germany, France, Luxemburg, Netherlands, Greece, Finland, Sweden, United Kingdom

Source: Eurostat/TNO. *Note: Employment figures include both employers and employees.*

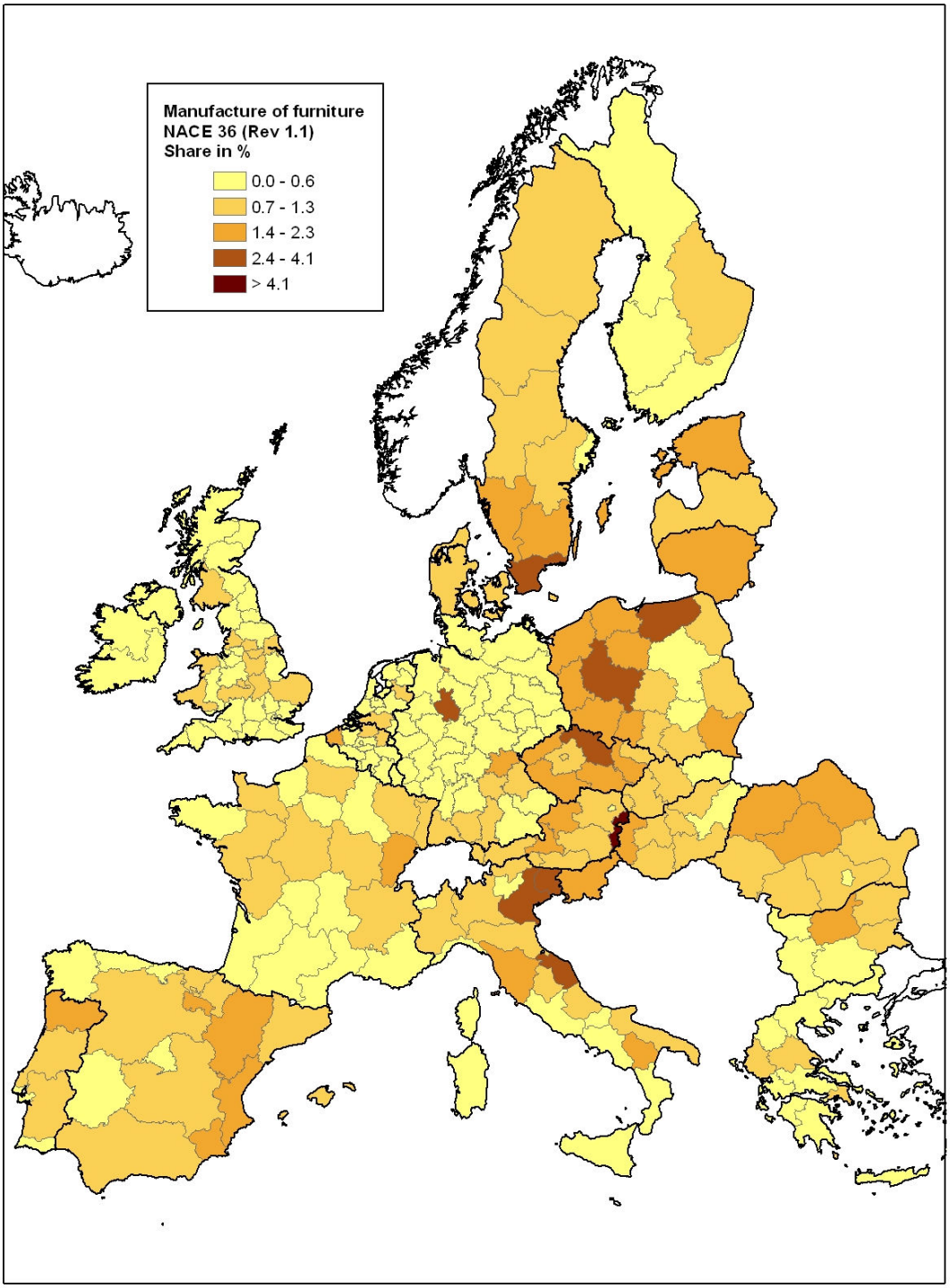
The list of winners in Table 3.2 characterises clearly what happened during the last decade: eight out of ten Central and Eastern European Member States increased their share of employment. Seven of these countries had a strong specialisation in the furniture industry (as shown by a concentration coefficient larger than 100). In jewellery, seven Central and Eastern European Member States raised their shares. None of these countries except for one had such a specialisation in the base period.

Regional specialisation

The regional specialisation in employment pattern for the furniture sector is shown in Figure 3.2. The most specialised regions in 2006 at the NUTS 2 level were in Poland, the Czech Republic, the border regions in Austria with Hungary, the North of Italy and the South of Sweden. What the figures clearly show is that the sector is clustered in specific regions, mostly with lower wage structures and related craft traditions.

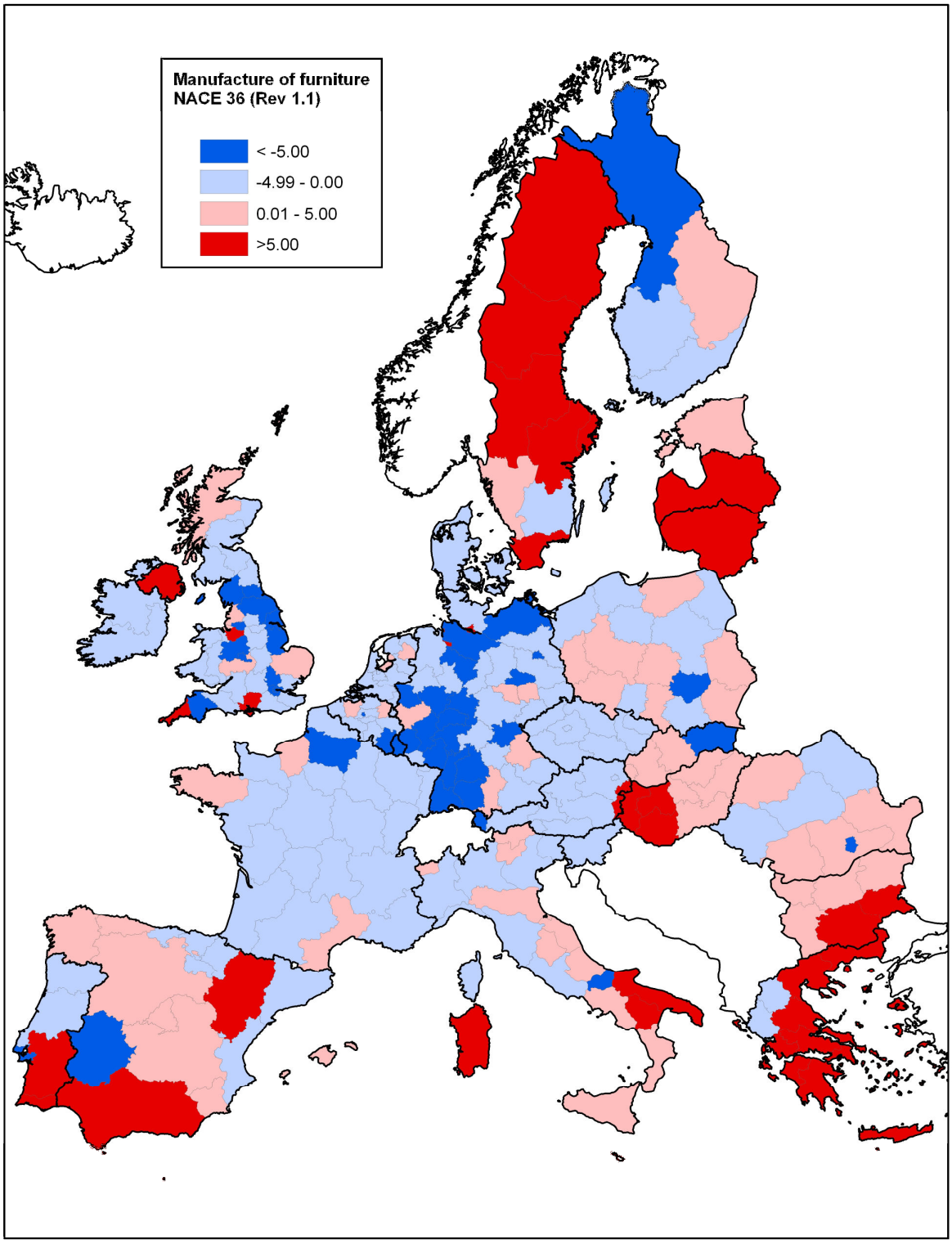
Figure 3.3 shows the annual changes in employment at the regional level. Strong growth is exhibited in Latvia, Lithuania, Central and North Sweden and parts of Spain, Greece, Hungary and Bulgaria. The most important regions in decline are the North of Finland and part of Germany and the UK.

Figure 3.2 Vertical shares: employment in the furniture sector as share of total employment, by NUTS 2 region, 2006



Source: Eurostat/TNO

Figure 3.3 Changes in employment in the furniture sector by NUTS 2 region, 1999-2005 (in annual percentage change)



Source: Eurostat/TNO

3.2 Employment and value added trends EU compared to US, Japan and BRICs

Traditionally international competition in the furniture sector is less fierce than in other sectors, due to the high costs of transportation of relatively heavy furniture. However, the

introduction of "flat-package" furniture, light-weight furniture (bamboo, plastics, …) has led to an increase in competition from new emerging competitors, most importantly the soc-called BRICs: primarily China, but to a lesser extent also Russia.[2]

Table 3.3 Employment and value added trends compared to USA, Japan & BRICs, 1995-2005

Trends in employment and value added 1995-2005 [1]	Employment growth	Change in share of employment of manufacturing total	Value added growth	Change in value added share	Value added growth per employee
Europe (EU 15)	2.5 %	0.1 %	25.8 %	0.0 %	22.7 %
United States	- 7.2 %	0.6 %	27.8 %	0.3 %	37.1 %
Japan	- 36.9 %	- 0.2 %	- 46.8 %	- 0.3 %	-15.6 %
***BRICs*[2]**					
Brazil	16.8 %	-0.3 %	-7.7 %	-0.4 %	-21.0 %
Russia	59.2 %	0.7 %	162.6 %	-0.2 %	65.2 %
India	28.9 %	0.1 %	111.3 %	0.0 %	63.2 %
China[3]	103.7 %	0.6 %	594.8 %	0.2 %	241.1 %

Source: TNO, based on UNIDO (ISIC Rev. 3). [1] EU-15: 1995-2004 (Except France: 1996-200; Germany: 1998-2004; Greece: 1995-1998; Luxembourg: 1995-2003; Portugal: 1996-2004), data for Europe (EU-15) composes of data of individual EU-15 countries; USA: 1997-2004; Japan: 1995-2004 [2] Brazil: 1996-2005, Russia: 2001-2005; India: 1998-2004.[3] Data for China based on ISIC Rev2

When we compare employment growth in the TRIAD regions (EU, US and Japan) of the furniture sector broadly defined during the period 1995-2005, the EU-15 clearly outperformed the US and Japan. As Table 3.3 shows, the EU witnessed employment growth rates of 2.5% compared to declines of 7.2% and 36.9% in the US and Japan, respectively. Despite the employment decline in the US, the share of furniture in overall manufacturing employment in the US has actually increased much stronger compared to Europe and Japan, showing that other manufacturing sectors in the US experienced an even stronger employment decline in the same period. A strong growth in value added of almost 26% in the EU-15 and 28% in the US compared to a drop of almost 47% for Japan, indicates that Japan is losing momentum in the furniture industry, while the US and EU successfully contribute to value added growth. However, the US was able to increase its value added per employee much stronger than the EU-15 which indicates a relative gain in competitive advantage. Note, however, that we observed in the previous section a surge in value added and employment in the new EU

[2] Brazil, Russia, India, China.

Member States, which is not included in these figures. In Japan value added growth per employee showed a considerable decline.

When we compare the performance of the EU with that of the BRICs, a very different picture emerges. Russia and China show very high growth rates in employment, and the share of furniture in total manufacturing employment is rising in all BRICs except for Brazil. Value added growth in China has been impressive with almost 600% (!), but also India and Russia showed significant growth (111% and 163%, respectively). Only China showed higher value added growth rates for furniture than in the rest of the manufacturing industry, but only marginally so (0.2% share increase). Value added growth per employee shows a significant increase in Russia, India and especially China.

3.3 Employment structure and work organisation

Firm size and structure

Whilst the majority of firms can be categorised as small and medium enterprises (SMEs), in the new Member States firms tend to be larger on average, with a share in the two larger firm categories being twice the EU-15 average (see Table 3.4). Smaller firms have tended to lose ground in the new Member States, whereas they gained it in the EU-15, especially so in the original EU-6. Most of the furniture production in the new Member States is based on mass production automated manufacturing exploiting scale economies. Production in the EU-15 has moved to smaller series production based on tailor-made production and mass customization using advanced design capabilities and specialty technologies. In essence, this small series production yields products with a higher value added enjoying a stronger demand in the more affluent European countries.

Table 3.4 Share and change in shares in number of firms by firm size, 2005 and 1999-2005

	Share 2005			Total share change 1999-2005		
	<50	50-249	>250	<50	50-249	>250
EU	97.7	1.9	0.4	0.2	-0.1	-0.1
EU-15	98.1	1.6	0.3	0.4	-0.3	-0.1
NMS	96.3	3.1	0.6	-0.5	0.6	-0.1
Winning	97.7	1.9	0.3	-0.5	0.4	0.1
Losing momentum	96.6	2.8	0.5	0.2	0.0	-0.2
Upcoming	99.7	0.3	0.0		-10.7	-2.4
Retreating	97.2	2.3	0.5	0.6	-0.5	-0.1

Source: Eurostat/TNO

Gender and age composition

The workforce in the furniture sector is predominantly male: men accounting for 70% of the labour force overall (see Table 2.7). The share of women has increased slowly in the period 2000-2006. Growth was 4% in the EU as a whole, 2% the EU-15, and 1% in the new Member States. Yet in the latter the share of women is substantially higher than in the EU-15 (38% against 27%).

Compared to other sectors workers in the furniture sector are relatively young: those under 40 years of age make up 53% in the EU overall, being 49% in the EU-15 and 60% in the new Member States. In the EU-15 the share of young workers is decreasing. A small increase of 1% is witnessed in the new Member States. Still, the sector has major problems in attracting young personnel, especially in the EU-15. This lack of attractiveness seems at least partly image-related; it also reflects relatively low pay (wages).

Education

Most workers in the furniture sector have medium education level, with 47% in the EU-15 and even 85% in the new Member States (see Table 3.5). The number of employees with a low education level is moderate to low, with 36% in the EU-15 and only 6% in the new Member States. The decrease in low educated has been 9% in the 2000-2006 period alone.

Table 3.5 Employment by gender, age and education - furniture

	EU		EU-15		NMS	
	Level	Change	Level	Change	Level	Change
Women	30	4	27	2	38	1
Age < 40	53	-6	49	-9	60	1
Age 40 – 50	27	3	29	5	25	-2
Age > 50	20	2	23	4	15	1
Low education	28	-11	36	-7	6	-9
Mid education	48	11	47	3	85	14
High education	14	1	16	3	9	-5
Definition	Level % 2006	Total change % 2000-2006	Level % 2006	Total change % 2000-2006	Level % 2006	Total change % 2000-2006

Source: Alphametrics/Eurostat/TNO.

3.4 Employment: main emergent competences

One of the most interesting indicators for the future-oriented part of this study is the trends and developments that can be identified at the (micro) level of job functions. More than aggregate employment and more than figures about gender and age distribution can changes in job functions tell us something about ongoing change and restructuring in the sector. Changes in (the need for) competences and changes in the distribution of job functions are closely linked to each other, both at the level of the sector and at the level of the firm. Competences are combined in occupation profiles, and can be distinguished in core competences, specialization competences or complementary competences (Rodrigues, 2007:34). Another distinction is between theoretical, technical and social competences (i.e. knowledge, skills and competences in ECVET) (ibidem). Identifying the changes in job functions by sector is a first step towards a better understanding of the changing competence needs in the sector. Competences for the purpose of this study are assumed to be located in a general grid defined by the main occupation functions: general management, marketing, financial and administrative management, R&D, logistics, production management, production, quality and maintenance (Rodrigues, 2007:35). R&D in the furniture sector itself is quite limited. Most R&D takes place outside the furniture sector in the manufacturing of machines and the research on new paints and adhesives, and other supplying sectors. Many of the current innovations take place in the phase of product design and are result from the creative activity of designers. Furniture design, especially in the top segment of the market, is often outsourced and designers working for different sectors come up with innovative combinations of new materials and technologies developed in other sectors and applying these to furniture.

As a first step towards identifying trends in competences, the observed changes in the distribution of job functions over time will be analysed. In a second scenario-based step, the need for future changes in knowledge, skills and competences will be assessed. The first step starts with an analysis of the state-of-play, i.e. the situation as per 2006. Subsequently, changes in job functions over time are discussed, both in general (overall) and for different categories of workers classified according to educational level.

Note that the described changes apply to NACE class 36, i.e. furniture and other industries, rather furniture as such. Even though the furniture sector makes up three-quarters of overall employment in NACE 36, it is obvious that the changes do not hold for each and every individual job function to the same extent. Data should therefore be interpreted with care.

With regard to skills, it is observed that in the EU as a whole the number of labourers declined with 2% annually (see Table 3.6). Smaller declines in employment occurred in the job categories metal machinery workers and precision handicraft workers. The number of managers increased somewhat, as did the numbers of architects / engineers (design), office personnel, other professionals, and leather and textile workers. Between the EU-15 and the new Member States the picture is quite different. Roughly speaking, the very same job functions that grew in the new Member States over the period 2000-2006 lost ground in the EU-15, and vice versa. The number of managers, architects, engineers and other professions increased in the EU-15. This is again an indication that regional specialisation patterns in the sector across Europe have tend to differ and have increased since 2000. The EU-15 is more oriented towards the upper part of the market, requiring functions like design, marketing and organisation of production, whereas the new Member States tend to focus more on mass production.

Table 3.6 Occupation shares by country grouping furniture and other industries 2000-2006

	EU-15	NMS	EU	Winning	Losing momentum	Upcoming	Retreating
Managers	1	-1	1	2	-2	3	1
Computing professionals	0	0	0	0	0	0	0
Architects, engineers	2	0	1	1	2	0	1
Business professionals	0	-1	0	0	0	-1	1
Other professionals	2	-3	1	2	-12	2	1
Office clerks and secretaries	1	0	1	-1	1	1	1
Service workers	0	0	0	-1	-1	-1	-1
Extraction and building trades	0	-2	0	0	1	1	0
Metal. machinery workers	-1	-1	-1	-2	2	-1	-2
Precision. handicraft. craft printing	-1	-2	-1	0	0	0	-2
Food processing, wood treaters	-3	9	0	-3	14	-5	3
Textile, garment, pelt., and leather	-1	6	1	2	3	1	-2
Assemblers	0	1	0	0	0	3	1
All other craft and trades workers	0	0	0	1	6	-1	0
Labourers	0	-6	-2	1	-14	-2	-1
Total							

Source: Eurostat/TNO

Women enter the sector, but not in all occupations. Since 2000 the number of female computing professionals, clerks and secretaries, textile treaters and labourers has decreased in the new Member States. For occupations such as architects, engineers, other professionals and especially also machinery workers and wood treaters the opposite applied. The number of labourers, office clerks and computing professionals were the only job categories that attracted more men in the new Member States.

Tables 3.7, 3.8 and 3.9 present employment changes by education level. Overall, the number of low educated employees decreased, th in the EU-15 and in the new Member States (see Table 3.7). With overall employment in the sector increasing, this underlines a process of up-skilling. What is striking is an increase in some of the white collar job functions, including

managers. In the new Member States white collar jobs amongst low educated has tended to decrease, however, while in the EU-15 it has increased. In general, the share of medium educated employees has risen strongly, especially in the new Member States (Table 3.8). Medium educated employees gained further share in blue-collar functions, like metal workers and textile treating, assemblers and labourers. White collar functions have grown in importance in both the low and the high skilled segment, but with medium educated staff losing. The number of higher educated employees gained in almost all kinds of functions, but especially so in white collar type functions, with the exception of managers (see Table 3.9).

Table 3.7 Occupation shares by country grouping furniture and other industries 2000-2006: low education

	EU-15	NMS	EU	Winning	Losing momentum	Upcoming	Retreating
Managers	4	-1	3	4	15	7	-1
Computing professionals	2	0	2	8	33		0
Architects, engineers	3	-4	2	10	0	37	-4
Business professionals	-3	1	-1	0	11	-10	-3
Other professionals	3	0	3	2	16	15	-1
Office clerks and secretaries	2	-5	0	-4	9	13	-4
Service workers	-2	-12	-5	-6	9	22	-10
Extraction and building trades	2	2	4	4	-27	-5	2
Metal. Machinery workers	-12	-4	-12	-24	-26	-18	-9
Precision. handicraft. craft printing	0	-14	-3	-5	-8	-14	-11
Food processing., wood treaters	-8	-7	-14	-33	-26	-19	-2
Textile, garment, pelt., and leather	-8	-8	-20	-41	-33	-19	-12
Assemblers	-14	-3	-16	-29	-6	2	-27
All other craft and trades workers	-8	-15	-12	-19	-38	-8	-11
Labourers	-7	-18	-9	-18	-6	-10	-8
Total	**-7**	**-9**	**-9**	**-20**	**-8**	**-10**	**-8**

Source: Eurostat/TNO

Whereas furniture has traditionally relied on specialised craftsmanship and technical skills, workers increasingly need to combine and integrate a heterogeneous set of skills, drawing on, amongst others, creative skills, marketing and project management skills in order to deal with issues such as flexibility, early problem detection, quality, and client orientation.

Table 3.8 Occupation shares by country grouping furniture and other industries 2000-2006: medium education

	EU-15	NMS	EU	Winning	Losing momentum	Upcoming	Retreating
TOTAL							
Managers	-3	8	-1	6	-18	8	-3
Computing professionals	-5	-10	-6	-36	-44		-2
Architects, engineers	-8	-13	-10	-9	-16	-34	-11
Business professionals	-2	0	-1	-7	12	-1	1
Other professionals	-7	6	-4	-11	6	10	-11
Office clerks and secretaries	-1	-4	-1	0	-14	-8	5
Service workers	-4	16	1	-1	-12	-28	9
Extraction and building trades	-1	4	-1	1	27	2	1
Metal. machinery workers	12	2	11	21	25	26	8
Precision. handicraft. craft printing	-2	14	1	4	0	7	6
Food processing, wood treaters	6	6	13	31	23	18	2
Textile, garment, pelt., and leather	6	10	19	40	31	16	9
Assemblers	9	1	13	28	10	-1	18
All other craft and trades workers	6	14	11	18	37	5	8
Labourers	7	18	8	15	8	5	9
Total	**3**	**10**	**7**	**18**	**12**	**8**	**4**

Source: Eurostat/TNO

Table 3.9 Occupation shares by country grouping furniture and other industries 2000-2006: high education

TOTAL	EU-15	NMS	EU	Winning	Losing momentum	Upcoming	Retreating
Managers	-1	-7	-2	-10	3	-15	3
Computing professionals	2	10	4	28	11		2
Architects, engineers	4	17	8	-1	16	-3	15
Business professionals	4	-1	2	7	-23	11	2
Other professionals	4	-7	1	9	-22	-25	12
Office clerks and secretaries	-1	9	1	4	5	-5	-1
Service workers	6	-4	4	7	3	6	1
Extraction and building trades	-1	-6	-3	-5	0	2	-2
Metal. machinery workers	0	2	1	3	1	-8	1
Precision. handicraft. craft printing	2	0	2	1	9	7	5
Food processing., wood treaters	2	1	1	1	3	0	0
Textile, garment, pelt., and leather	2	-1	1	1	2	3	2
Assemblers	5	2	4	1	-4	-1	8
All other craft and trades workers	2	1	1	1	1	3	2
Labourers	1	0	1	3	-2	5	0
Total	**3**	**-2**	**2**	**2**	**-4**	**1**	**4**

Source: Eurostat/TNO

Companies have reacted to these changes by setting up internal training programmes but also through cooperation and partnerships with education and research institutes. However, in many regions, there are not enough schools and training centres to provide for the initial education of the workers. In addition, internal training programmes come under pressure due to increased competitive pressures. Training periods have been significantly reduced to make workers operational as quickly as possible. Employment issues are easier to solve for companies located in areas where there is a geographical concentration of firms in the same sector (i.e. clusters) due to better network relations and the possibility to organize joint training boards. In-company training often takes place through schemes in which older experienced workers train young entrants. A problematic issue in this context is the lack of pedagogical capacity of seniors as well as modern technological expertise which seriously hampers the transfer of essential know-how.

The average firm in the furniture industry has a production of EUR 0.8 million per year, compared to an EU manufacturing average of EUR 2.5 m. The total number of people employed in the furniture industry in the EU-27 in 2000 was 1.42 million. This number decreased to 1.32 million in 2005 (i.e. minus 7.1%). Employment increased rapidly in other countries outside the EU. In Turkey, for example, employment in the furniture sector surged by 97% during the period 1995-2001. Ditto, in Morocco employment rose by 33% during the period 2000-2004. Within the furniture industry, the hard home and garden furniture subsector (NACE 36.14) employs 52 % of the sector; chair manufacturing accounts for 22% of sector employment.

3.5 Analysis of productivity and labour costs

Labour productivity in the furniture sector amounted to EUR 25,700; in wage adjusted terms labour productivity was 124.6 %, which is considerably below the non-financial business economy average (see Table 3.10).

Table 3.10 Labour productivity in furniture and other industries (NACE 36), 2004

	Apparent labour productivity (EUR thousand)	Average personnel costs (EUR thousand)	Wage adjusted labour productivity (%)
Manufacture of furniture	**25.7**	**20.6**	**124.6**
Manufacture of jewellery and related articles;	28.0		120.0
Manufacture of musical instruments			110.0
Manufacture of sports goods	39.1	27.1	144.2
Manufacture of games and toys;			149.0
Miscellaneous manufacturing n.e.c.			

Source: Eurostat (SBS)

The wage adjusted labour productivity of the other subsectors ranged from 110% (manufacture of musical instruments) to 149% (manufacture of games and toys). Overall, only the subsector manufacture of games and toys has a wage adjusted labour productivity that is higher than the non-financial business economy average of 148% (Eurostat, 2007).

The annual increase in wages in the furniture industry (NACE 36) was around 2.2 % between 1995 and 2005 (UNIDO 2008).According to another source (IFM 2007). labour costs have not changed significantly in the EU-25 with an increase in labour costs of only 3% between 2000 and 2006. Compensation for workers in the US has increased by 15% from 2000-2005 and in India by 16% from 1998-2003

3.6 Industrial relations

Furniture making which was originally a rural craft industry became mechanised early in the nineteenth century and this gave rise to frequent amalgamations of small unions into ever larger and more powerful units. There were three major amalgamations during the nineteenth century and this trend continued until the 1970s. Large furniture trade unions emerged in the UK and the US. In the last 30-plus years, however, specialized furniture workers unions have been integrated into the general trade unions. For instance, the Furniture, Timber and Allied Trade Union in the UK merged in 1994 with the General, Municipal, Boilermakers and Allied Trade Union, a general trade union with more than 600,000 members. The unions provide a range of professional services. Nevertheless, the furniture industry today cannot be considered as a strongly unionized industry. Still, organised action in the furniture sector happens from time to time, as witnessed by recent actions in the Czech Republic and South Africa.

At the same time, the European wood and furniture sector features a web of networks at the international, national, and subnational level. They include:

- Industry Associations (Federations); for example the Union Européenne de L'ameublement (UAE) being the European Furniture Manufacturers Federation Another association is CEI-Bois, the European Confederation of woodworking industries, representing the interests of the European woodworking industry,
- Chambers of Commerce;
- Export associations;
- Associations of firms with the Technological Institutes;
- Cooperation associations;
- Production associations (auxiliary industries);
- R&D associations: INNOVAWOOD, technological institutes universities and industry associations;
- Training centres; and
- Production clusters.

3.7 Partnerships

One of the central tenets of the renewed Lisbon Strategy is the partnership concept. By building a European partnership for growth and employment, the reforms needed to boost growth and employment will be facilitated and speeded up (European Commission, 2005). Partnership in this view "mobilises support" (mobilisation) and "gets the different players at work together" (collective effort), as well as "makes sure that the(se) objectives and reforms are taken on board by all the various players" (thus spreading ownership) (ibidem, page 14). In the implementation of the European Cohesion Policy, the partnership principle is fundamental as well. The EU recognises the importance of involving local and regional actors, in particular in areas where greater proximity is essential such as innovation, the knowledge economy and new information and communication technologies, employment, human capital, entrepreneurship, support for SMEs and access to capital financing. Beyond that public-private partnerships and the improvement of governance in the fields of entrepreneurial innovation, cluster management, innovation financing are promoted at all EU levels – from the local to the regional, the national as well as the European level and across

economic sectors. Partnerships for innovation, skills and jobs, in connection with the industrial high level groups, clusters, lead markets and technology platforms are being promoted at European and national level.

For the purpose of the project, examples of functioning partnerships for innovation, skills and jobs have been identified, showing the following characteristics:

- *Involvement of all relevant actors:* companies, research organisations, education and training institutions, financial institutions, public administration, etc.
- *Cross-sectoral approach:* Partnerships which are assigned to a specific business sector, but work across different business sectors
- *Cross-thematic approach:* Partnerships linking innovation, skills and jobs;
- *Inclusion of general human needs into the partnership strategy:* Partnerships including general human needs, such as housing, health or mobility into their formulated (broad) vision or strategy
- *Long term commitment of actors:* Partnerships which are characterised by a long term commitment of its members
- *Joint problem solving:* Partnerships working on problems which can not be met by one member alone
- *European dimension:* Partnerships which are established at the European level. Where no good examples at the European level could be found, inspiring and credible examples at the national or regional level were identified which could serve as a role model or best practice example for establishing a similar partnership at the European level.

On several occasions partnerships (networks or clusters) for innovation, skills and jobs can create a leverage effect for innovation, especially if they take strong(er) account of general human needs.[3] For instance, partnerships in the tourism sector aiming at developing 'leisure' should have knowledge in, e.g., tourism, culture, sport and environment. A partnership aiming at developing the quality of habitat consequently should combine knowledge on at least construction, furniture, electronics and urban management. Partnerships for Innovation, skills and jobs integrating general human needs on European level are still very rare, even though the potential benefits of partnerships are clear.[4] One is likely to find more inclusive partnerships on national and regional level, but also on these levels, not all elements of the Rodrigues definition are included.

There are, however, good examples of partnerships in various sectors at the national and the regional level. Some of these stand out in terms of partnership approach, innovation capacity, approach for skills development, or their job maintaining and creating capacity. Examples include the City Fringe Partnership for developing regional job opportunities in the printing sector and the ERRAC and EURNEX network in the rail sector where a European approach is

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[3] An argument put forward by professor Rodrigues at the workshop "Innovation policies for a knowledge intensive economy – assessing the European experience" in 2005 in Brussels.

[4] Outside the scope of the current studies, there is at least there is one good example, the European Construction technology platform (see http://www.ectp.org/default.asp).

combined with a strong effort to integrate latest research results in a virtual European training curriculum.

Partnerships, networks and clusters on innovation, jobs and skills often face specific and similar obstacles, whatever sector is at stake. These include:

- *Restricted scope:* Partnerships often are set up in order to solve problems which can not be met by one partner on its own. The problems, thereby, are either defined bottom-up or articulated by the politics in a top-down process. In the latter case, the scope of partnership is limited to their given geographical scope and/or their thematic focus (If partnerships are established top-down as instrument to address specific problems they are usually restricted to the policy represented by the awarding authority, e.g. a particular Ministry). Similarly, partnerships and networks established at the European level, such as e.g. networks of excellence, technology platforms, etc. have a specific thematic focus (in this case innovation in research and development).
- *Short-term nature:* Partnerships which are built up by means of public funding are often project driven, feature a short term nature and, generally, intend to be not sustainable due to their dependence of a single fund.
- *Weak direct links between skills, jobs and innovation processes:* Skills upgrading and job opportunities are a result of innovation processes. Therefore, partnerships which focus on innovation do seldom focus on skills and jobs with the same strong interest.
- *Sectoral restrictions*: In general partnerships working on international or European level seem to be more likely to occur in strongly internationalised economic sectors with a common universal challenge (e.g. pollution or sustainable development). Then they are mostly limited to the problems they want to address.

This section presents an example of a successful partnership in the furniture sector.

The initiative „Zukunftsinitiative Möbelindustrie NRW -ZiMit GbR" (www.zimit.de) was founded by the Federal Government of North-Rhine Westphalia in 2001. Partners include the Ministry for Economic Affairs and Energy, the employer organisation of the sector, sector enterprises, employees and the trade union IG-Metall. The main objective is to strengthen competitiveness and the long-term employment outlook in furniture manufacturing. In order to achieve this goal several activities are carried out by the initiative aiming at developing the market, optimising production and corporate processes, improving the training system and knowledge transfer in the sector. Research and education institutions as well as business counsellors are involved in different activities on a non-permanent basis.

The projects *"PROLOGcode"* and *"PROLOGkompass"*, for instance, were implemented together with two universities of applied science. The projects' objectives were to jointly develop new product and design strategies and to built up an innovation management system. Projects results include the development and marketing of new products. Experiences gained from the projects were disseminated and transferred through several workshops.

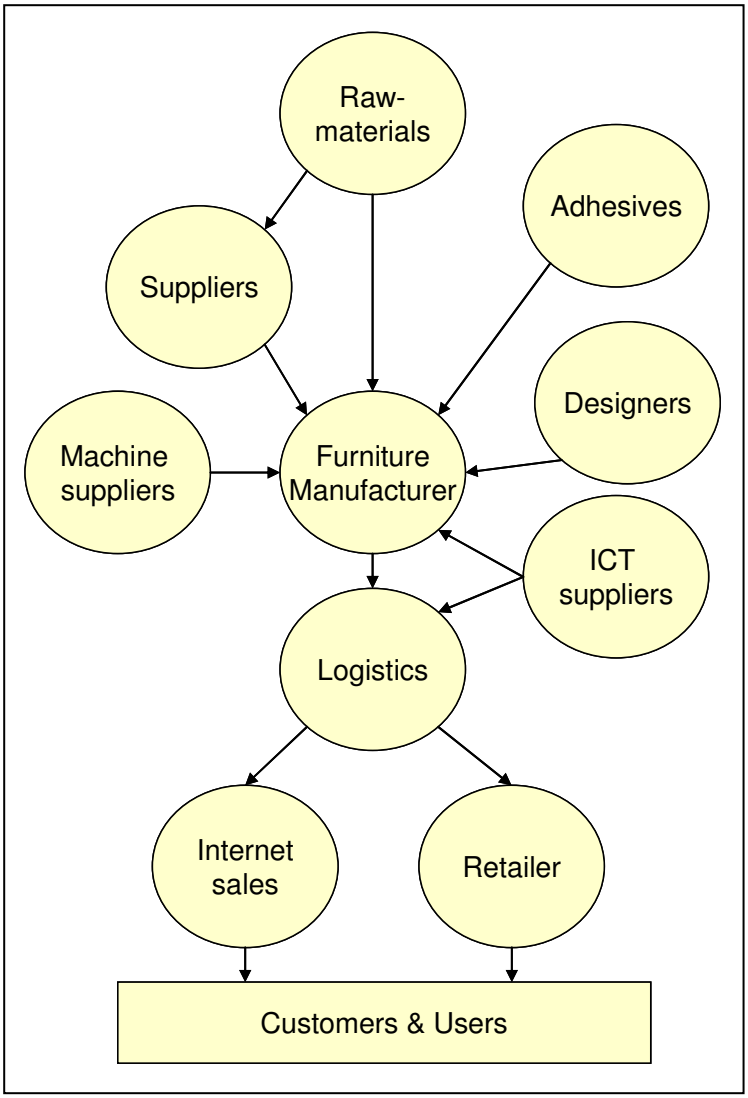
The competitiveness of the furniture manufacturing enterprises in North-Rhine Westphalia is ZiMit's main focus. The initiative is not an inclusive cross-sectoral partnership but it seeks to combine on project basis different stakeholders. ZiMit co-operates with several partners to upgrade skills of the workforce in the sector. Co-operating partners include vocational colleges, consulting organisations and the Technology Information Centre of North-Rhine.

Their main activities consist of actions to strengthen the responsibility of the enterprises for qualification, to build up sustainable qualification structures, to survey qualification needs and to develop tailored training courses.

4 Mapping of the value chain

The production of furniture involves many steps and various relations between suppliers of raw materials (traditionally wood, but increasingly other materials such as metals, glass and plastics), machinery, paint, etc., as is shown in Figure 4.1.. The figure does not include the packaging industry, which becomes increasingly important in the sector.

Figure 4.1: Value chain in furniture manufacturing



Lately, design has become a crucial element with ever-growing importance, especially for high-value added producers. Production clusters represent common labour and technology pools, i.e., with a concentration of specialised technology providers and labour in one location. However, so far the industry appears to have little vertical integration over the various steps in the production process, even though large furniture companies organize the global supply chains. The consumer furniture sector supplies to retailers/retail chains, large traders and independent exporters. Since many retailers are large firms and most furniture manufacturers are SMEs, the retailer has greater purchasing power over the manufacturer. Many retailers have exclusive right of selling furniture in a specific country or region and they set the conditions for the manufacturer for delivery of furniture.

Another development is the outsourcing and or off-shoring of (parts of) the manufacturing process to specialized suppliers or to lower wage countries in Europe or Asia. Western European furniture manufacturing companies open their own factories in Eastern Europe or establish joint-ventures with Eastern European or Asian manufacturing companies for the lower cost manufacturing of standardized parts for furniture or for the whole production and assemblage of furniture. Language and cultural differences as well as different quality standards have been drivers for re-sourcing part of the manufacturing process back to some SMEs in Western Europe.

Some large retailers, like IKEA, have their own manufacturing companies in (Eastern) Europe. These manufacturing companies produce almost exclusively for the retailers, who in the case of IKEA also does the product design and development. .

E-Commerce in the sense of selling of furniture over internet has not proved to be successful yet. Consumers want to see, touch, feel and test furniture in real life before making the decision to buy.

5 Sector dynamics and the role of technological change, R&D and innovation

The evolution of the wood and furniture sector reflects underlying trends such as the globalization of the economy and increasing international competition, changing marketing and business models, as well as changing consumer behaviour and tastes. Apart from technological innovation, organizational innovation and shifting client/customer orientations are changing the sector.

Generally, the furniture industry is considered as a low-tech, labour-intensive sector (Scott, 2006). Investments in internal R&D processes are low to non-existent, with very few firms engaging in radical breakthrough technologies and hardly any firm protecting its intellectual property through patents. This is not to say that the sector is technology-extensive or unaffected by technological change (Maskell, 1996). The main focus in terms of innovation is in combinations of proven technologies and incremental improvements. Over the past decades, large volume producers have benefitted significantly from high-speed automation. This is often combined with an upgrade in manufacturing logistics, in order to allow for the small batch production and fully automated control. The sources of technological changes are often found outside the sector, for example, in the wood processing machinery, IT services, paints and lacquer. Most of the changes towards high-speed automation already took place one to two decades ago. Production processes in most furniture producing firms have not witnessed any significant changes over the last decade.

It is important to acknowledge the polarity in the furniture industry between on the one hand the above mentioned low to medium-priced, automated mass-produced furniture and, on the other, high-quality craft-based furniture offering higher added value. Innovation in the high-quality furniture industry lies mainly in non-technological areas. Various mechanisms can be identified. An important and well-known strategy to add consumer-value to furniture is through aesthetically appealing design. Either designer competences are acquired inside the firm or, as is the case with companies like Ikea, Andreu World, Ahrend, Roset, or Sellaton, strategic partnerships with professional free-lance designers are set up. The increased importance of design is partly related to another strategy to increase value added, notably branding. Moreover, various furniture firms are striving to provide global solutions for their customers in the form of project management, assembly and maintenance, and turn-key solutions.

A robust automation process has taken place in kitchen and office furniture. CAD/CAM techniques are standard in big companies but are also introduced in SMEs, increasing the overall level of flexibility. Data show that countries like Lithuania, Latvia and Hungary have strongly invested in furniture machinery during the period 2001-2004, with increases of 36%, 29% and 27% annually year. At the same time, Portugal, Belgium and Germany have witnessed strong reductions in investment (decreases of 20%, 20% and 19 % annually), sign of a gradual relocation of the industry towards the new Member States.

In general new business models could have various innovative options for the furniture manufacturing industry. Some of these new business models include a closer involvement of users in the product design. For example in the UCIM (User-Centred Innovation for Manufacturing: Roadmaps for Development - FP6 SSA) project, new scenarios for a more competitive European furniture industry with a greater role for users were developed. In those scenarios new innovative concepts like furniture leasing, customizable furniture, user-designed furniture, on-site manufacturing and self-production using 3D models were used and validated (IFM 2007). Other business models that are under consideration are a stronger marketing of furniture brands and several furniture firms are experimenting with full online marketing and sales of furniture in order to bypass the traditional retailer.

New organisational models are another category of new innovations. Some furniture manufacturing companies are created that focus only on the design and leave the manufacturing to companies in Asia. These companies try to focus on the added value of design and the organisation of the value chain.

Another main line of innovation is the use of different and new kind of materials in furniture. Traditionally furniture is made from wood (hard either soft), while furniture made from metal, aluminium and plastic has entered the market the last decades. Furniture designers are searching for new unique designs and are searching for the application of new materials. Sometimes this includes the application of traditional materials that are relatively new to the furniture sector, including glass, concrete, natural stones and robe (e.g. “knotted Chair of Marcel Wanders. Other applications include the use of newly develop materials such as new wood-plastic composites, scratch-resistant coatings, self-healing materials or coatings and wood with ‘improved’-characteristics (wood that is chemically or thermally treated in order to add or improve certain characteristics).

In the design phase the designers have to be aware of the existence of different materials and their characteristics, while also the furniture manufacturer has to have the knowledge and the capacity to treat different kind of materials in order to make new furniture. Most small and medium sized furniture manufacturers have so far only experience in wood treating, while also the furniture education institutes in Europe have a strong focus on the treatment of wood

which makes the step towards diversification of materials difficult to make. Larger furniture companies have often already introduced plastic or metal furniture for consumer and business markets. Companies who focus on design and have outsourcesd the manufacturing process have more freedom to create new furniture design with other materials than wood than the SME furniture manufacturer with employees and production process organised for the production of wooden furniture.

6 Trade, globalization and international competition

6.1 An overview of international competition

Furniture has turned from a practically non-tradable sector two to three decades ago into one of the largest tradable industrial sectors worldwide. It is now in the top 20 export products in the three-digit SITC nomenclature. Countries can have distinct comparative advantages, such as low wages, timber resources, and automation and design. This leaves room for both low- and high-income countries to take part in either competitive or complementary markets (Maskell, 1998).

Technological change has paved the way for important on-going globalisation trends in the industry. In combination with flat-pack or ready-to-assemble furniture, high-speed automation opened the way for firms to design, manufacture and ship products in large quantities. Moreover, there are indications that mass-produced, low to medium-price furniture is increasingly manufactured in low-wage economies, with a considerable degree of concentration in large production facilities. Table 6.1 shows how countries like China, Poland, and Mexico have risen considerably on the list of world exporters of furniture in the past decades.

In the face of emerging low-wage economies, competition on the basis of labour unit costs does not offer a sustainable basis for competitiveness for European furniture making. Production with a higher value added offers a more promising road to sustained competitiveness instead. This is also illustrated by the significantly higher value added per worker in advanced economies. One of the strongest assets for EU exporters is origin labelling. “Dutch Design” or “Made in Italy” labels are reported to give a competitive advantage.

In this context, it needs to be mentioned that the relocation to low wage countries in the furniture sector has not gone as far as in low-tech, labour intensive industries such as clothing or footwear (see Table 6.2). However, the trend in the furniture sector, as expressed by the difference between indicators in different points of time, is very pronounced; actually, it is much more pronounced than in clothing or footwear. Thus, the share of less developed countries in world exports of furniture more than doubled from 1994 to 2004, as compared with a 22% increase in the clothing sector and a decline in the footwear sector.

Table 6.1 Major world exporters of furniture, 1984, 1994, 2004 (in current ECU/EUR, representing furniture exports to all countries)

1984		1994		2004	
Country	**ECU billion**	**Country**	**ECU billion**	**Country**	**€ billion**
Italy	1.56	Italy	7.91	China	15.76
East Germany	1.32	Germany	4.73	Italy	14.10
Taiwan	0.61	United States	4.09	Germany	9.42
United States	0.50	Canada	2.56	Canada	6.79
Denmark	0.46	Taiwan	2.18	United States	6.34
France	0.45	Denmark	2.11	Poland	6.18
Belgium–Luxembourg	0.43	France	2.09	Mexico	5.22
Sweden	0.38	Belgium–Luxembourg	1.78	France	3.74
Canada	0.33	China	1.83	Denmark	3.41
United Kingdom	0.30	United Kingdom	1.30	Belgium	2.72
World totals	8.38		44.68		106.52

Source: Scott (2006). Note: ECU used to represent a weighted basket of EU currencies before the introduction of the euro.

Table 6.2 Relative export performance of developing and developed countries

Sector	1984	1994	2004
Clothing	1.38	1.95	2.37
Footwear	0.73	1.52	1.50
Furniture	0.23	0.38	0.82

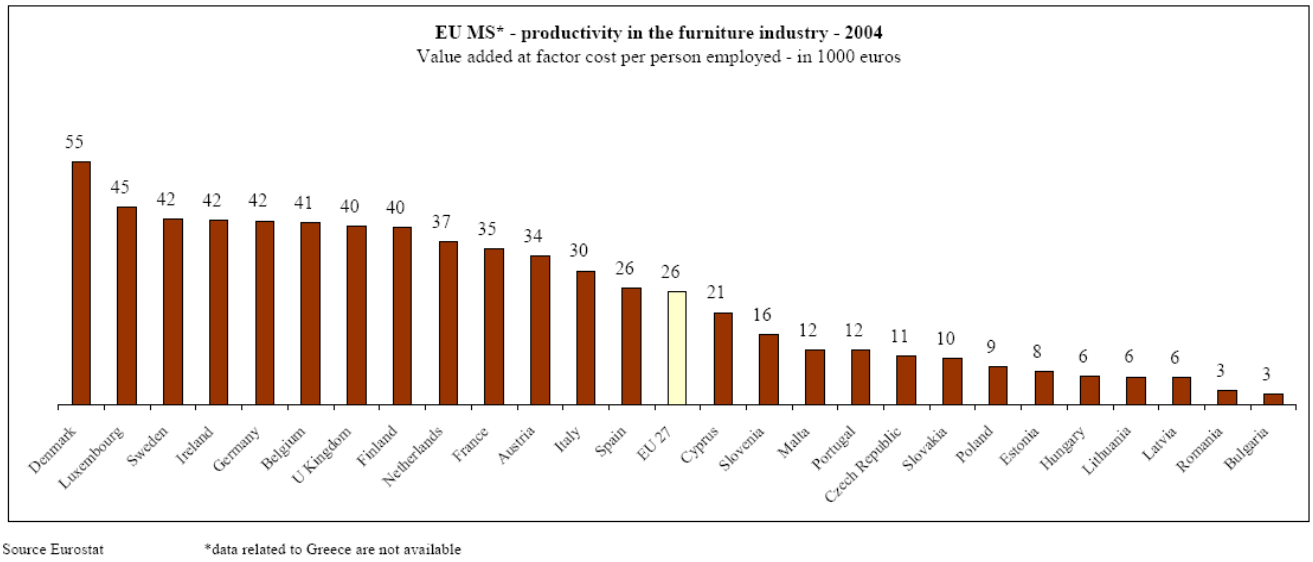
Source: IFM 2007. Note: data in the table show ratio of less developed to more developed countries in regard to total value of exports per sector.

Due to higher transportation costs per unit of output, global competition in the furniture sector has been less fierce than in industries like footwear, leather, apparel, and textiles. However, the influence of this factor has been diminishing with the spread of flat-pack and ready-to-assemble furniture. Hence, proximity to the market, while continuing to be important, is no longer the determining factor. This was starkly demonstrated by a surge of furniture exports from China, which became an important global player with a prominent presence in the U.S. and, to a lesser extent, the EU. As a result, there is a strong tendency towards the

concentration of the furniture production in the developing countries, as shown in Table 6.3. *Overall, the furniture industry can be characterized as an industry "in the throes of intense global competition"* (Kaplinsky and Readman, 2005), as indicated by growing number of exporting countries, falling unit prices, and a tendency towards a common price.

Labour productivity (Figure 6.1) increased markedly in the largest developing countries – by 160 % in China (over the period from 1998-2003) and by 70 % in India (1995-2003). The twelve New Member States show an increase in value added per capita of 32 % from 2000 to 2004. Seats and chairs manufacturing (164 %), hard wood furniture (63 %) and mattresses (61 %) were mainly responsible for this growth.

Figure 6.1 Productivity in the EU furniture industry (value added per person employed)



Source Eurostat *data related to Greece are not available

Source: IFM 2007

The furniture industry in the EU is under intense pressures from globalization, as reflected by the increasing number of countries exporting there and by intensified presence of low-income countries on the EU market. However, the top 12 countries with a market share in the EU of more than 1% are all EU members.

New Member States have significantly increased their market share over the last decade. The exports of EU 27 grew at 2.9% a year for the last 10 years, slightly faster than the overall economic growth of 2.3% per annum. At the same time, the new Member States showed a spectacular average annual growth rate of exports of 15.6% while their overall growth was only 3.2% per year. Thus, furniture exports appeared to be an important (albeit small) source of overall growth. The new Member States appear in the list of winners, with Hungary in the list of upcoming countries (see Table 6.3).

The change of the trade balance is striking (Table 6.4). In the EU-15 the trade balance deteriorated, as well in the overall EU, whereas in the new Member States the trade balance improved. With the growth figures of the GDP in mind, this indicated a shift of comparative advantage from the west to the east – and maybe to the rest of the world. The export of this industry in the new Member States grew faster than the imports. On the one hand, this sector seems to be dependent on a strong domestic demand; on the other hand, the production is dependent on lower wages, since it is a labour intensive industry. This implies a strategic

choice; contact with the demand market and the need of cheap labour could not easily be combined.

In Italy, the sector seems to be in crisis. Value added of the sector declined and the trade balance went down steeply. The trade balance is still very positive, but the decreasing trade balance indicates a steep loss of competitive power. The reason is that fast growth of imports over exports. The general pattern is that in the new Member States cheap labour explains the gains in exports over imports, whereas in the EU-15, especially the EU 9, imports are stronger than exports due to the rise in domestic demand. Contrary to the EU-15, the new Member States have a positive trade balance. Moreover, it has further improved from 1995 to 2006 in all new Member States under consideration.

Table 6.3 Exports furniture and other industries 1995-2006

	Exports	**1995-2006**	**As share in value added**	**1995-2006**
	Million Euro 2006	%		
EU	98982	4.1	136	26
EU-15	82369	2.9	122	18
NMS	16613	15.6	300	100
Winning	41526	4.9	199	37
Losing momentum	11422	1.4	391	86
Upcoming	14887	7.3	80	16
Retreating	31147	3.1	102	22

	Concentration >100	Concentration <100
Growth	**Winning**:	**Upcoming**:
	Italy, Austria, Portugal, Czech Republic, Estonia, Lithuania, Poland, Slovenia, Slovakia	France, Greece, Spain, Hungary
Decline	**Losing momentum**:	**Retreating**:
	Denmark	Germany, Luxemburg, Netherlands, Finland, Ireland, Sweden, United Kingdom

Source: Eurostat/TNO

As regards the revealed comparative advantage (Table 6.5), it increased in four new Member States while declining in the other three new Member States. In addition, the list of the countries with increasing revealed comparative advantage included Austria, Greece, Ireland, Portugal, Germany and the Netherlands.

Table 6.4 Trade balance furniture and other industries, 1995-2006

	Trade balance	1995-2006
	Million Euro 2006	*Total abs. change 1995-2006*
EU	-2548	-7629
EU-15	-13462	-14587
NMS	10914	6958
Winning	11856	8650
Losing momentum	14568	-2404
Upcoming	-2456	2242
Retreating	-26516	-16117

	Concentration >100	Concentration <100
Growth	**Winning**:	**Upcoming**:
	Austria, Czech Republic, Estonia, Hungary, Ireland, Lithuania, Poland, Portugal, Slovenia.	Germany
Decline	**Losing momentum**:	**Retreating**:
	Denmark, Italy	Belgium, Finland, France, Greece, Luxemburg, Netherlands, Spain, Sweden, United Kingdom.

Source: Eurostat/TNO

6.2 Analysis of trade issues of relevance and importance to the sector

Trade barriers in the furniture sectors are relatively low, with a notable exception of the U.S., which levies anti-dumping duties of up to 198 per cent on imports of wooden bedroom furniture from China worth US$1 billion. In the EU, similar protectionist measures have been under elaboration, but yet not implemented. This means that exports from low-wage countries, and especially China, have been mounting pressure on European and American producers. Access to raw materials constitutes an advantage for the furniture production; as witnessed by the example of East European countries presented in Section 6.3.

Table 6.5 Revealed comparative advantage furniture and other industries 1995-2006

	Revealed comparative advantage	1995-2006
	2006	*Total abs. change*
EU	-3	-11
EU-15	-16	-21
NMS	79	22
Winning	59	62
Losing momentum	61	-20
Upcoming	-31	9
Retreating	-56	-31

	Concentration >100	Concentration <100
Growth	**Winning**:	**Upcoming**:
	Austria, Greece, Ireland, Portugal, Czech Republic, Estonia, Lithuania, Poland	Germany, Netherlands
Decline	**Losing momentum**:	**Retreating**:
	Italy, Denmark, Spain, Hungary, Slovenia, Slovakia	Belgium, France, Luxemburg, Finland, Sweden, United Kingdom

Source: Eurostat/TNO

6.3 Role of externalisation strategies (outsourcing and offshoring).

As mentioned before, trade data shows a tendency towards relocation of furniture production to developing countries. Many activities of the production process are being outsourced. There is a tendency towards the disintegration rather integration of the production process.

There is a common trend in the companies' strategy to outsource all the functions that are not distinctive or core competences of the company. Companies understand that it is worth focusing on their core competences and distinctive value-added activities, while subcontracting other services and products to the best providers. Thus, manufacturers often take the contract-manufacturing approach instead of setting up their own facilities in developing countries (Xu *et al.*, 2003). Two types of business strategy emerge:

- product diversification (width): production of a wide range of products increasing the product offer, e.g., contract seats, sofas, office seats, car seats, etc.; and
- product specialization (depth): focus on a specific product developing its many varieties by varying hue, finishing, materials, size, colour and dimensional ranges in one product, e.g., sofas.

The IFM (2007) study reports an overall decrease of production volumes for the EU high cost areas except for the high quality market segments. As illustrated above, Asia sees largest growth in production. Delocalisation brings about both negative and positive effects for EU producers. On the positive side, it helps the EU firms in high cost areas to lower production costs and/or logistics, which allows for resource mobilisation to make necessary investments in marketing, retailing and research, etc. to create higher added value.

In the case of furniture ensembles for kitchens or offices, larger European manufacturers have outsourced the production of components to neighbouring and/or new EU member states and focus on the larger value added part, that is, design and the production of doors and tops. In addition, outsourcing to the New Member States helps companies with market penetration in the region. An increase in production volumes indeed occurred in the low and medium cost EU countries. Delocalisation is closely related to supply of raw materials in combination with low labour costs. The destination countries have been Poland, Czech Republic, Slovenia, Slovakia, and Romania – for wood pieces, and Hungary and, increasingly, Turkey – for leather items. There is some evidence that the fragmentation of the EU industry slows down delocalization, because of a lack of middle and senior managers to carry out a major restructuring.

7 Regulation

The evolution of EU regulations pertinent to the furniture sectors over the last 15 years is characterized by growing importance of the four main areas:

- Consumer rights and labelling
- Safety at work
- Environmental issues, and
- Product safety, mainly children's furniture and fire behaviour.

Environmental concerns have become overwhelmingly important. The use of water paints, powder paints, foams and polyaminates free of CFC are all examples of innovations carried out by the furniture sector due to tightened environmental norms and regulations. Moreover, uncertainties regarding EU legislation in the area of environmental protection cause delays and reductions in large investments and contribute to the fact that the sector is involved mainly in incremental innovation (IFM 2007).

Efficiency has become a major source of cost control due to rising energy, water, and similar costs. This has also spurred innovation processes geared at process improvement, process redesign, and integration. However, these improvements offer little potential in terms of consumer added value.

8 SWOT

The SWOT table is presented below in Figure 8.1.. The furniture sector is an established sector with long history, substantial technological advances and established markets. Nevertheless, it suffers from high labour costs compared with emerging competitors in developing countries. The furniture sector is an industry "in the throes of intense global competition." However, globalization offers new opportunities for the sector via increasing demand for high-end furniture in BRIC countries.

Table 8.1 SWOT furniture sector

Strengths	**Weaknesses**
• Mature and dynamic sector with high quality technology and design • Established markets within and outside of Europe • Prestigious image among designers	• High labour costs in the EU-15 and growing labour costs in the NMS • Needed upgrade in training infrastructure • Ageing labour force • Poor innovation levels
Opportunities	**Threats**
• Increasing demand (in general and in high quality segment) with incomes rising • Increasing international demand in high-end furniture in emerging markets (BRIC) • New products in line with lifestyle changes and eco-furniture trends • Developing new business models and customer relation systems	• Need to adapt to competitive pressures, as this is an industry "in the throes of intense global competition" • International outsourcing and, to a smaller degree, offshoring • However, protectionists tendencies • Further tightening of environmental and safety regulations • Increasing cost of raw materials (wood) • Purchasing power of retailers

9 Drivers

9.1 Identifying sectoral drivers: methodology and approach

The methodological framework as defined by Rodrigues (2007) serves as the starting point for the identification of drivers. Rodrigues identifies three main driver categories: economic, technological and organizational drivers, with the economic dimension representing the main trends in demand and supply, the technological dimension covering the main trends in process and product innovation (including services) and the organizational dimension representing main trends in job functions (conceptual, executive). The Rodrigues' approach in principle enables the identification of drivers, and especially so at the meso (sector) and micro (firm or company) level. The search and identification procedure of drivers itself is less well defined, however. Implicitly it is assumed that expert opinion and desk study are sufficient tools to come up with a relevant and plausible set of drivers at the sector level.

During the first stage of the project, a methodological tool (approach) has been developed to facilitate and help the identification and further delimitation of Apart from expert opinion mobilised and managed as discussion panel (in a similar manner as SWOT analysis is usually organised), this approach strongly builds on the findings of existing foresight and other future studies. By consistently linking the search for drivers with the findings in existing foresight and other future studies, a more coherent and all-embracive methodology to finding sector-specific drivers can be deployed.[5] This so-called *'meta-driver' approach* of identifying main sectoral drivers starts from a more generic list of meta-drivers derived from a literature survey, and subsequently in a step-wise manner delimits the drivers to a set of most relevant and credible drivers. It does so by combining adequate expert (sector) knowledge in a panel setting. By subsequently asking the expert panel to score the different drivers on a range of characteristics, including relevance, uncertainty, and expected impact (similar to a SWOT procedure), a corroborated and conclusive list of sector-specific drivers can be derived. The meta-driver approach hence enables filtering out in a systematic and consistent way meso and possibly micro (sector-specific) as well as the macro (economy-wide) trends and developments judged relevant and important to the sector, directly and indirectly.

The meta-driver approach includes the following five steps:

Step 1. Drawing up of a list of relevant generic or meta-drivers based on literature review and expert knowledge (check-list: rows)

Step 2. Designing a list of key questions in order to identify the sector relevance and other properties of meta-drivers at sector level (check-list: columns)

Step 3. Filling in the check-list matrix: which meta-drivers do matter most for the sector?

Step 4. Which drivers do matter most for jobs and skills?

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[5] Common ways to rank trends and drivers are the DESTEP (Demographic-Economic-Social-Technological-Ecological-Political) and STEEP (Social-Technological-Economic-Ecological-Political) categorisations. For our purpose, slightly altered DESTEP definitions are used to reflect the embracing dimension of analysis.

Step 5. Does the tailor-made list herewith cover all relevant sectoral drivers, i.e. are there any sector-specific drivers missing (check on completeness)

Arguments in favour of the use of the 'meta-driver' approach are:

- The ability and opportunity to use the rich potential of a multitude of already available studies on drivers, determinants of change and key trends
- Circumventing the risk of a too narrow focus on the sector per se while acknowledging sector-specificity, and avoiding the risk of analyzing sectors as if they were isolated (cf the difference between 'general equilibrium' and 'partial equilibrium' approaches)
- Guaranteeing overall consistency, coherence and completeness, as well as warranting a same point of departure important across lots/sectors – i.e. a way of integral assessment, making sure that all important factors are systematically taken on board.

An alternative and second way to arrive at a list of main sector-specific drivers of change is to start with a SWOT and subsequently translating the Opportunities and Threats part into sector-specific drivers. The SWOT is used as a tool to verify and check the resulting list of drivers. By combining the results of both the [meta-drivers → sector-drivers] and the [SWOT → sector-drivers] exercise a complete and consistent list of sector-specific drivers can be derived.

9.2 Identification of sectoral drivers

The main drivers of the furniture sector (rated at 8-10) and presented in Table 9.1 are:

- Outsourcing and offshoring;
- Global / regional production networks (dispersed production locations, transport);
- Counter-trend regionalism / protectionism;
- Increasing market segmentation (tailor made production, mass customization);
- Availability and price of other natural resources (wood);
- Innovation through application on new technologies, materials and design
- Environmental regulation; and
- Security and safety regulation.

These factors were introduced in the previous chapters and will be further elaborated in the context of scenario presentation in Chapter 10.

Table 9.1 Drivers furniture sector

Category	Driver	Is this driver relevant for the sector? Y / N	How relevant is this driver for the sector? Scale 0-10	How uncertain is this driver for the sector? Scale 0-10	Are substantial impacts expected on the volume of employment? Y/N	Are substantial impact expected on employment composition? Y/N	Are substantial impacts expected on new skills? Y/N	Short, medium or long run impact?[6] S	M	L	Are substantial differences expected between (groups of) countries? Y / N[7]	Are substantial differences expected between subsectors? Y / N[2]
Ageing / demographics	Ageing - Adapt to the market demands of an ageing and more diversified society	N										
	Ageing – declining labour force	Y	3	2	N	Y	Y	N	Y	Y	N	N
	Population growth (birth and migration)	Y	7	2	Y	N	N	N	N	Y	Y	N
Economic	Income per capita and household	Y	7	3	Y	N	N	N	Y	Y	Y	Y
	Income distribution	Y	5	2	N	Y	Y	N	Y	Y	Y	Y
Globalisation	Outsourcing & offshoring	Y	10	3	Y	Y	Y	Y	Y	Y	Y	Y
	Increasing global competition	Y	7	3	Y	Y	Y	Y	Y	Y	Y	Y

[6] Short = 0-3 years; medium = 3-7 years; long = > 7 years. All three categories may apply

[7] If necessary include footnote in cell with more precise info what differences are.

Category	Driver	Is this driver relevant for the sector? Y / N	How relevant is this driver for the sector? Scale 0-10	How uncertain is this driver for the sector? Scale 0-10	Are substantial impacts expected on the volume of employment? Y/N	Are substantial impact expected on employment composition? Y/N	Are substantial impacts expected on new skills? Y/N	Short, medium or long run impact?[6] S	M	L	Are substantial differences expected between (groups of) countries? Y / N[7]	Are substantial differences expected between subsectors? Y / N[2]
	Emerging economies driving global growth (new market demand, especially BRIC[8] countries)	Y	5	8	N	--	--	N	Y	Y	Y	Y
	Global / regional production networks (dispersed production locations, transport)	Y	9	4	Y	Y	Y	Y	Y	Y	Y	Y
	Counter-trend regionalism / protectionism	Y	8	5	Y	Y	Y	N	Y	Y	N	Y

[8] BRIC countries: Brazil, Russia, India, China

Category	Driver	Is this driver relevant for the sector? Y / N	How relevant is this driver for the sector? Scale 0-10	How uncertain is this driver for the sector? Scale 0-10	Are substantial impacts expected on the volume of employment? Y/N	Are substantial impact expected on employment composition? Y/N	Are substantial impacts expected on new skills? Y/N	Short, medium or long run impact?[9] S	M	L	Are substantial differences expected between (groups of) countries? Y / N[10]	Are substantial differences expected between subsectors? Y / N[2]
Cultural values	Increasing market segmentation (tailor made production, mass customization)	Y	10	2	Y	Y	Y	Y	Y	Y	Y	Y
	Lifestyle changes	Y	4	3	--	--	--	N	N	Y	Y	Y[11]
	Increasing demand for environmentally friendly / organic products	Y	5	7	--	--	--	N	Y	Y	Y	Y[12]

[9] Short = 0-3 years; medium = 3-7 years; long = > 7 years. All three categories may apply

[10] If necessary include footnote in cell with more precise info what differences are.

[11] Lawn and leisure furniture; furnishing second homes.

[12] Eco-furniture.

Technology, R&D and product and process innovation	Advances in IT impacting on organizational structures & new business models	Y	6[13]	5	N	Y	Y	Y	Y	Y	Y	Y
	Internet changing production and consumption patterns (e-business; etc.)	Y	2	2	N	Y	N	Y	Y	Y	Y	Y
	New types of work organisation (teams-based, sociotechnique, etc.)	Y	3	8	Y	Y	Y	Y	Y	Y	Y	Y
	New/additional value-added services	N										
	Other (sector specific): Innovation through application of new materials and design	Y	8	5	N	Y	Y	Y	Y	Y	Y	Y
Natural resources	Availability (and price developments) of oil and energy	N										
	Availability and price of other natural resources	Y	8	8	Y	N	N	Y	Y	Y	N	Y
Institutional / Political	Trade and market liberalisation (national level)	N										
	EU integration – deepening (single European market etc.)	N										

[13] Production processes and business models.

	EU integration – broadening (bigger domestic market)	N										
	Quality of institutions (judiciary, transparency, lack of corruption, viable business climate, structural rigidities)	N										
	Labour market regulation	Y	2	2	Y	Y	Y	Y	Y	Y	Y	N
	Environmental regulation	Y	8	3	Y	Y	N	Y	Y	Y	Y	N
	Security and safety regulation	Y	8	3	Y	Y	N	Y	Y	Y	Y	Y[14]

[14] Such as consumer safety regulations.

Part II.

Future Scenarios and Implications for Jobs, Skills and Knowledge

Part II. Future Scenarios and Implications for Jobs, Skills and Knowledge

Guide to the reader

Part II presents the scenarios and their implications for jobs, skills and knowledge. It reflects steps 4, 5 and 6 of the common methodology. The contents of part II are as follows: Chapter 10 describes the structure and highlights the content of the four main scenarios (step 4). For each of these scenarios plausible yet different assumptions have been made as to how the main drivers of change will develop and add up to different states of the future. In subsequent steps the implications of the scenarios for jobs and skills are analysed. In order to facilitate a translation of these implications to the job function level, first a workable job function structure is proposed. This structure is based on the functions as they appear in Eurostat's Labour Force Survey and further elaborated. Chapter 10 discusses the main implications of the scenarios in terms of future employment volumes by job function (step 5). Chapter 11 assesses the implications of scenarios for future skills and knowledge needs by job function. It translates the implications of the scenarios for skills and knowledge by function (step 6).

10 Scenarios

10.1 Overview of scenarios and main underlying drivers

Figure 10.1 presents four different scenarios and their underlying drivers for the furniture. The scenarios which were specifically constructed for and used in this study are based on a clustering of relevant drivers identified in part I.

Figure 10.1 Drivers and scenarios for the furniture sector

<table>
<tr><td colspan="2"></td><td colspan="2">Endogenous, sector specific drivers:
• Environmental, health and safety regulations
• Market segmentation, customisation, different consumer types and life styles
• New services and business models</td><td></td></tr>
<tr><td colspan="2"></td><td colspan="2">Full customisation</td><td></td></tr>
<tr><td rowspan="2">Exogenous drivers:
• Globalisation: competition, emerging markets
• Outsourcing and off-shoring
• International production networks
• Technology: new materials (hi-tech furniture, ICT)
•</td><td rowspan="2">Local:
Slow growth
Low importance
Small
Slow growth</td><td>(3)
Local customisation</td><td>(4)
Global design and customisation</td><td rowspan="2">Global:
Fast growth
High importance
Large
Rapid growth</td></tr>
<tr><td>(1)
Local mass production</td><td>(2)
Global mass production</td></tr>
<tr><td colspan="2"></td><td colspan="2">Mass production</td><td></td></tr>
</table>

The scenarios are construed to ‘scan’ the future, and are for the purpose of this study used to assess the impact of future developments on jobs, skills and knowledge. It is important to understand what scenarios can deliver and what not. Scenarios depict plausible futures and might reveal possible paths of development towards these futures. They are neither predictions or forecasts, nor wishful pictures (‘dreams’, ‘crystal ball gazing’) of the future. Grounded in existing data and trends, scenarios are derived in a logical and deductive way, with different and sometimes opposing presumptions about how key drivers might develop, resulting in inferences about plausible, i.e. credible and imaginable, futures.

In drafting the scenarios, a clear distinction has been made between exogenous and endogenous drivers; the horizontal axis in the figure represents the relevant exogenous drivers, whereas the vertical axis represents the relevant endogenous drivers. The main difference between the two categories of drivers is the scope and ability for direct influence. Exogenous drivers are drivers that form a “given” for the sector without much

room for influence for/by individual actors drivers. Endogenous drivers are drivers that can be influenced at the sector level, for instance by national or European policy-making. Only those drivers that received the highest ranking - a score between 8 to 10 on a scale of 0 to10 (see chapter 9) - have been taken into consideration.

10.2 The drivers – building blocks for scenarios

The drivers form the main fundament and can be regarded as the key building blocks for the construction of the scenarios. One of the central tenets of the scenarios identified here is a clear distinction between exogenous and endogenous drivers. The endogenous drivers are defined as those drivers that can be directly influenced by governmental actors, in other words where there is the scope and ability to change the course of action by policy-making, either at the regional, national or European level. Two sets of drivers - which *a priori* might also be labelled endogenous factors - are not included in the scenarios, namely: (a) Possible actions and measures at the industry and company level itself; and (b) Actions and measures directed towards the educational and training system. The reason for excluding these drivers in the formulation of the scenarios is that they have to be regarded as solutions (or so-called strategic options), which logically follow from the scenarios as implications rather than as building blocks for the scenarios. These strategic options represent the degrees of freedom for policy measures and other actions (see further section 6: main strategic choices to meet emerging skills needs).

The drivers were selected during the previous phase of the project on the basis of a number of criteria, the most important being relevance and significance for the furniture sector, potential impact and degree of uncertainty. Only those drivers with the highest overall ranking with scores from eight to 10 were taken into consideration.

High-scoring *endogenous* drivers for the furniture sector are:

- Increasing market segmentation: changing consumer characteristics, needs of different types of consumers, changing lifestyles, demand for environmentally friendly products, use of non-traditional materials, etc.;
- Environmental regulation; and
- Security and safety regulation.
- New services and business models for furniture manufacturers

High-scoring *exogenousl* drivers for the furniture sector are:

- Outsourcing and off-shoring;
- Increasing global competition;
- Global / regional production networks (clusters); and
- Innovation through the application of new materials and the use of innovative designs in the furniture industry

Externally, globalization and increased international competition (mainly from China at the moment, but later also from other emerging countries), and related processes of outsourcing of production, the segmentation of the production chain and the emergence of international production networks will have a major impact on the European furniture industry. This trend leads to a growing role of global furniture companies. These companies may produce furniture themselves, or they may be design and retail companies who outsource the actual furniture production to a range of different suppliers (e.g., IKEA).

Endogenous drivers are more directly related to the dynamics of the furniture sector itself. Traditionally, the sector has been characterized by mass production of a limited number of standard furniture models. An important trend is away from traditional mass production of furniture and towards new, more flexible models of production where individual customer preferences play an important role and where customers are also involved in the design and finishing of the furniture. This customisation trend is also a strategy for the furniture industry to generate value added. Innovation plays a large role in the customisation trend. More focus on innovative design is important, as well as the possibility to apply many new materials in furniture design, which often is made possible by advancing knowledge and treatment of materials to give these materials the characteristics that are required for application in furniture. The possible application of rapid manufacturing technologies open up new possibilities for furniture design, but also create the possibility of mass customisation: furniture as mass production, while each single product is adapted and customised to the individual customer wishes. New innovations in business models, including marketing, branding, leasing concepts or new service concepts open new possibilities for the furniture industry, including both retailers and furniture manufacturers.

10.3 The scenarios – detailed discussion

Based on the combination of endogenous and exogenous drivers identified above, we discriminate between four sector scenarios for the European furniture sector, namely:

- **Scenario I: Local mass production**. This scenario is essentially a continuation of the status quo. The importance of globalization in this scenario is not very high as result of measures to protect the position of EU producers. European producers (many of them small- and medium-sized enterprise [SMEs]) continue to produce along traditional lines. In high labour cost countries like EU-15 a further mechanisation will diminish the labour factor. Due to higher costs of mecahnisation this process will continue in large firms, but will later also be introduced in SMEs. Although there is some protection for EU producers, this scenario will result in closure of firms and reduced employment because the industry fails to renew itself and will not be able to cater to the demands of an increasingly segmented market, consisting of a large number of small niches.
- **Scenario II: Global mass production**. This scenario maintains the traditional approach to furniture design and manufacturing, but open markets speed up the processes of delocalization, outsourcing and the growth of global furniture value chains. Global mass production will be controlled by a few large companies who are not necessarily producing furniture themselves, but will concentrate on design, logistics, integration of the production chain and marketing. The production will take place in low wage labour countries, or will be done in high wage labour countries in furniture firms with a high degree of mechanisation, automation and robotisation. Implications for EU employment are mixed with reductions in the old Member States and possible gains in the NMS based on low labour cost. Eventually, as labour costs in the NMS rise, production will shift to lower wage countries or will remain in Europe with a high degree of automation and will therefore offer limited employment.
- **Scenario III: Local customisation**. This scenario combines the two trends of relatively low levels of international competition and a much more important role of consumers in design and customisation. The EU furniture industry tailors its production

to an increasingly segmented market of different types of consumers (young and old, middle class and upmarket, etc.). Customers themselves become involved in design and adaptation, using web-based tools. Shops provide advice to customers on design and help with practical support. This scenario emphasizes up-market, high-value and quality production, tailored to a wide range of different customers. It requires the development of new systems of production organisation like lean manufacturing and mass customisation.. The involvement of users is important to engage the user in the product design and learn from the specific local customer demands. Furthermore, a good (local) branding is necessary for the company to attract and bind local customers. Production of wood based on local products can offer a new value added in the growing niche-market of regional products.

- **Scenario IV: Global customisation**. The process of mass customisation and catering to the demands of very different types of consumers is extended to the global level in this scenario. Due to different customer life styles and market segmentation, a wider variety of customers will be served through mass customisation at global scale. Chinese and other Asian companies who started producing cheap furniture for the mass market are following the example of European producers and increasingly provide tailor-made designs for individual consumers. Conversely, up-market European companies will start to cater to the demands of increasingly affluent upper and middle classes in the BRIC countries. Internet, web-based design tools, advanced logistics and systems of quality control allow customers to order tailor made designs directly from companies across the globe at very competitive prices. New production processes include rapid manufacturing, virtual prototyping and a higher degree of mechanisation and robotisation that make mass-customisation possible. Although at the moment in the furniture industry already a reasonable high degree of freedom is possible for the customer, in this scenario the customer is given even more freedom in customisation. Customers may want a greater choice in use of different materials, different colours, customizing all sizes and combining different materials in different shapes. Also the application of customers designs, patterns or pictures in the design (textile, table, glas doors etc) offers new extra value added and is already offered in construction industry. In the Global customisation scenario, customers have a higher degree of freedom in customising their furniture, while the production of furniture will be at the same speed as mass-production, which prevents a higher delivery time to the customer.

11 Job functions - towards a workable structure

In order to determine the quantitative and qualitative implications of the scenarios for jobs and skills, a workable job classification is needed. The occupational classification of the available sector data derived from the Eurostat Labour Force Survey (LFS) is used as a starting point (see Box 3). The advantage of using this classification is that developments in the past as observed in the LFS can help to foresee likely trends for the future. For example, it might be expected that future developments in new Member States in some cases will follow similar paths as old Member States in the recent past. Moreover, where strong growth of certain job functions appeared in most recent years, one might have a reason to cautiously weigh and re-assess any further increases in future years, as the situation (markets and other factors) might have stabilised in the mean time. The share of job functions in total sector employment is not unimportant either; sizeable shares call for adequate attention. This does not imply that job functions with only very minor shares of the total should be ignored altogether. It might well be that occupations that have small shares now will face strong growth in the oncoming years, or are strategic and vital for growth of the sector as a whole, even if small in size.

However, the LFS job classification cannot be taken over one to one. First, the given LFS definitions of the job function groups are highly aggregated and cover therefore highly heterogeneous but not always comparable job functions. Reporting on this most aggregate level therefore would not be very illuminating. Second, some functions which may be strategic for the sector when looking at the future can be 'hidden' in a broader statistical category. This also includes 'new' emergent job functions. For both reasons some of the aggregated categories have been split up into separate job function categories, which have been given a more in-depth treatment. The opposite case, where certain job functions may be closely related, but do not fall within the same statistical LFS class, may also apply. Here it would be logical to combine them.

Box 3. The European Labour Force Survey

The European Union Labour Force Survey (LFS) is conducted in the 27 Member States of the European Union and two countries of the European Free Trade Association (EFTA) in accordance with Council Regulation (EEC) No. 577/98 of 9 March 1998. The data collection covers the years 1983 to 2006 and covers all industries and occupations. The national statistical institutes are responsible for selecting the sample, preparing the questionnaires, and conducting the direct interviews among households. The Labour Force Surveys are centrally processed by Eurostat, using the same concepts and definition, based on the International Labour Organisations guidelines and common classifications: (NACE (rev 1), ISCO-88 (COM), ISCED, NUTS).

Although the LFS can be used for comparative purposes, the relative small sample size (in 2002 the sample size was about 1.5 million of individuals, which represents 0.3% of the EU population) means that error margins can be high, especially when the industry itself is rather small.

Source: Eurostat (2008)

Third, in the trend analysis it was already observed that whereas in some countries employment shares of a particular (production) job function were extremely large, similar

shares in other countries appeared extremely low, often with another closely related job function being much higher. A very likely explanation for this phenomenon is that in some countries workers are reported as job function x while in others they are reported as job function y, where basically similar tasks on the job are performed. By taking aggregates for these function types, this sort of reporting bias can be avoided. Fourth, the job functions that appear from statistical data analysis might not always be similar to what a person in or familiar with that sector would rank as the job functions that matter "in reality", i.e. from a work floor perspective. On the basis of discussions with experts and national sector skills studies, an attempt was made to provide a job classification that is both workable and recognisable by the sector in practice. This classification is shown as Table 11.1 below.

In order to establish a meaningful and appropriate classification, the existing LFS occupational classification for the chemicals sector was adapted by either aggregating and/or selecting further differentiating some professions out of the original LFS statistical classification. This exercise was based on four criteria:

- employment shares (aggregating);
- closely related job functions (aggregating);
- strategic role in sector (disaggregating by further selecting among the occupational groups identified in the statistical classification);
- emergent job functions not yet covered and/or brought fully to light by current statistics.

Table 11.1 shows the detailed job functions for the furniture sector, based on the original LFS classification and the classification (third column) used in the remainder of this study. The following functions have been distinguished:

- *Managers*: top management and company owners/ entrepreneurs, but also including different specialist managers, such as HRM, finance, production, sales, and R&D management.
- *ICT professionals:* ICT professionals such as system designers and programmers as well as lower computing professions and computer operators, as well as industrial robot controllers.
- *Industrial designers:* Designers are in most cases hired by furniture manufacturers to design a new furniture collection on project basis, but sometimes are also employed permanently by the furniture manufacturer.
- *Production managers*: professionals who do the contact with clients, plan, schedule and prepare the work for actual manufacturing. They translate the design from the industrial designers into a production work plan.
- *Accounting & finance professionals*: accountants and bookkeepers.
- *Sales & marketing professionals*: sales and marketing staff and product stewards, capable of marketing and branding local and/or global to retailers, users and buyers.
- *Supply chain managers*: the supply chain managers are responsible for the acquisition of the (raw) materials from suppliers regionally and/or globally. They are responsible for selecting the right quality materials for the right price and under the right delivery conditions.

- *Support staff*: including office clerks, secretaries & other support staff covering administrative functions (including order management and stock keeping), HRM staff, as well as other specialized professionals not covered by the other categories (e.g. lawyers).
- *Plant and machinery maintenance and repair workers*: machinery and precision workers such machinery mechanics and electrical and electronic equipment mechanics: often outsourced to machine manufacturers or service companies
- *Skilled handicraft workers*: skilled workers are capable of skilled manual handicraft work, often specialised in one specific material (e.g. wood).
- *Machine operators*: the skilled production workers, most importantly plant and machine operators, still a relative small share in the sector.
- *Labourers*: low-educated/skilled workers such as manufacturing labourers, caretakers, porters, cleaners and related workers.

Table 11.1 Job classification

Classification in Labour Force Survey (LFS)	Specific jobs of high relevance to sector falling in LFS classification	Job function categories as used in the next tables*
Managers	Corporate and specialist managers covering all firm functions	Managers
Computing professionals	Computer systems designers, analysts, programmers and computer associate professionals	IT professionals
Architects, engineers		Industrial designers
		Production managers
Business professionals	Accounting, finance and sales professionals	Accounting & finance staff
		Sales & marketing staff
Other professionals & technicians	Lawyers and economists, other science professionals, and associate professionals	Supply chain manager
Office clerks and secretaries Service workers	Office clerks and secretaries, receptionists and information clerks, transport conductors	Administrative support staff
Extraction and building trades	Machinery mechanics and fitters, metal moulders, welders, tool makers	Plant and machinery maintenance and repair
Metal. Machinery workers		Machine operators
Precision. Handicraft. Craft printing Food processing., wood treaters Textile, garment, pelt, and leather Assemblers, craft and related trade workers All other craft and trades workers		Skilled handicraft workers
Labourers	Manufacturing labourers; also maintenance and cleaning personnel; porters, etc.	Labourers

12 Implications of scenarios by job function – volume effects

Different futures will have different implications for jobs, both in quantitative and in qualitative terms. In this chapter the implications of the four scenarios in terms of volume effects for each of the identified job functions are assessed. Trends and developments of the recent past provide an important starting point in forming an idea about these future developments. This quantitative trend information has been combined with expert opinions of a core expert team and supplemented with insights from invited sector experts in a dedicated workshop to assess which volume effects would be likely to occur for which job functions. It should be emphasized that the referred expected changes are qualitative in nature, reflecting the outcome of expert judgements and expert discussion as well as desk research taking into account the results of other studies. The results of the following chapter should therefore be used as a supplement and an independent expert assessment in addition to other more formal analyses, e.g. based on mathematical and/or econometric modelling and simulation.

Main volume trends based on the period 2000-2006 are as follows:

- *Managers*: managers are representing around the 7% of employment in the EU furniture sector, with a higher representation in the New Member States (11%). A general trend is the decrease of high-educated managers and an increase in low-educated managers.
- *ICT professionals:* computer professionals are scarce in the furniture sector, representing only 1% of employment; which remained the same over 2000-2006. In the EU-15 the number of high and low educated computing professionals increased at the cost of the medium educated workers. In the New Member States there was an increase of high educated ICT professionals and an equal decrease in medium educated ICT professionals. An increase of importance of ICT professionals, due to a further digitalisation of administration, logistics, sales and an increase of the use of computers in design and production is expected.
- *Industrial designers:* the industrial designers form a very small group of total employment and are often hired from outside the furniture manufacturing sector for the design of new furniture-products. Although the importance of design is expected to increase, the absolute number of industrial designers will remain small. The impact of designers on the product and sales can be very large, especially with established and famous designers.
- *Production manager*: Production managers are people who translate the design into a work plan. These workers form a small percentage of total workers (less than 2%). It is expected that these workers in the future will require higher education levels, due to a more globalised, automated, robotised and digitalised production.

Accounting & finance professionals: the accounting and finance workers form a quite small share of employees in the furniture sector with less than 2% and this is expected to decrease in the future due to a further outsourcing of these tasks to service providing companies.

Sales and marketing: sales and marketing staff form a quite small share of employees in the furniture sector with less than 2%. An increase in the importance of sales and marketing is expected in the future.

Supply chain managers: the supply chain managers represent only a small share of the total workers in the furniture manufacturing. An increase of the number of supply chain managers is expected with the availability of many new materials that can be applied in the furniture industry.

Administrative support staff: the secretaries and office clerks represent around 10 % of the sector's workforce, although there was a small decline. In the New Member States there was an increase in high educated administrative support staff (9%), with a similar decrease in medium educated office clerks and secretaries (- 7%). The share of this job function is expected to decrease, due to rationalisation and digitalisation of the administrative procedures.

Plant and machinery maintenance and repair workers: the plant and machinery maintenance and repair workers form around 6% of the workforce and remained stable over the last period. With the increase of the applications of machines in the furniture industry, the number of maintenance and repair workers is expected to increase. Since the application of self-maintenance machines and maintenance and repair robots is not likely to be high in the furniture industry, this trend is expected to continue in the future.

Skilled handicraft workers: Skilled handicraft workers form the largest share of workers (over 50%). Although the share of skilled handicraft workers remained quite stable over the last period, a shift from low educated to medium educated workers was visible. In the New Member States an increase in skilled handicraft workers was visible. A sharp decline in the number of skilled handicraft workers is expected in the future due to automation and robotisation in the mass-production of furniture in the EU-15.

Machine operators: the machine operators represent around the 4% of the total workforce. There was a small decline (-1%) in the share of machine operators. A decline in low educated workers was compensated with an increase in medium educated workers. In the future a small increase in machine operators is expected because of the increase in the use and application of machines in the mass-fabricated furniture manufacturing.

Labourers: Labourers represent around the 7% of the workers. In the period 2000-2006 the amount of labourers in the furniture manufacturing decreased with 3% and in the New Member States with 17%. Furthermore a shift from low-educated to medium-educated labourers could be observed. A further decrease in the amount of labourers is expected in the future due to rationalisation and outsourcing of tasks typically performed by labourers to service companies.

The results in 4.1 represent the relative expected changes in the volume of workers by job category in the furniture sector per scenario for the period 2008-2020. The table shows the different selected job categories and the changes expected for each of the scenarios. In the last row an assessment of the overall expected job development is given.

The *global customisation* scenario gives the most positive results in terms of overall employment volume in 2020 (see Table 12.1). In this scenario the production of furniture will be based on mass customisation. This means that design, consumer-friendly software, and automated and robotised production are essential elements of a furniture manufacturer. In this scenario, Europe will be a leading region for well-established brands of furniture, which are suitable for adaptation according to individual consumer

preferences. This will result in more managers, ICT professionals and business professionals, specialized in the implementation of robots, rapid manufacturing and advanced, user-friendly (online) software for consumers. For both mass customisation scenarios, a growth is expected in the number of industrial designers. Designs have to be creative but also adaptable to mass customisation.

Table 12.1 Relative volume changes by job category under different scenarios

Job category	***Scenarios***			
	Mass Production		***Customisation***	
	Local	**Global**	**Local**	**Global**
Managers	M	M/I	I	I
ICT professionals	M/I	I	M	I
Industrial designers	M	M/I	I	I
Production managers	M	I	M	I
Accounting & Finance	M	M/I	M	M
Sales & marketing	M/I	I	I	I
Supply chain managers	I	I	M/I	I
Administrative support staff	M	M	M	M
Plant and machinery maintenance and repair staff	M/I	I	M/I	I
Skilled handicraft workers	D	D	M/D	M/D
Machine operators	M	M	M/I	M/I
Labourers	D	D	D	D
Overall job change	***D***	***M/D***	***M***	***M/I***

Notes: D =decrease, I=increase, M=maintain. I/M indicates "slight increase to stabilization of work force expected." Similarly M/D indicates indicates "stabilization to slight decrease of work force expected", etc.

For both mass production scenarios the number of jobs is expected to decrease. The mass production of standard series of furniture will be much more automated and robotised, which will be at the cost of the skilled handicraft workers and the labourers. In both mass production scenarios, there is a higher demand for ICT professionals, Production managers and a strong increase in sales & marketing workers, since the standard-produced products have to be branded and marketed locally or globally. Due to rationalisation and efficiency gains in both scenarios, the number of labourers and skilled handicraft workers is expected to continue to decline.

For the traditional (local) mass production scenario a small increase in ICT professionals is expected, because of further digitalisation of administration, logistics and production. There will be a small increase in staff in sales & marketing, since the marketing and sales is based on a strong regional link with customers from the same region, in which the furniture manufacturer has to build a strong brand with a regional image.

The global mass production scenario foresees an increase in the number of managers that have to organise and manage the global supply-chain as well as global sales. In order to stay competitive with other global furniture manufacturers, European companies in this scenario have to invest in short delivery times and in the automation and robotisation of the mass production of furniture. Both developments require ICT professionals who are able to program and operate the needed software. The global mass production scenario foresees that European furniture manufacturers will not only compete on price but also on design and brand image, which requires high quality designers. A small increase in the number of designers is expected.

For mass customisation (both local and global) many more and different skills are required, leading to an increase in many different job functions. The automation and robotisation required for mass customisation will be at the expense of labourers and to a lesser extent the skilled handicraft workers. The mass customisation requires a higher number of managers to organise the broad range of choices offered to customers in the design, materials and finishing of the product, the supply-chain, and the relationship with customers. For the scenario of global customisation this will require an (online) software tool for customers to customise their furniture. Compared to many other industries, the furniture industry has already quite some experience with customisation of furniture. However, under the customisation scenarios the customer will have a higher degree of freedom with regard to the design, material choice, size and finishing. The higher degree of freedom of choice of materials will require an increase of supply chain managers who are responsible for the acquisition of the right materials from all over the world. Also a global sales and marketing will require a higher number of sales and marketing workers.

For the local customisation scenario the competition will be less fierce and more local oriented. A better understanding of the local customer is needed as well as a stronger orientation on local suppliers of materials. Overall, for both scenarios handicraft workers and labourers will decrease in general and knowledge-based workers increase (managers, designers, strategic people).

13 Implications of scenarios – main emergent competences

13.1 Introduction

Determining emergent competences is at the very heart of this study. In order to identify the main emergent competences by occupational function, the Rodrigues (2007) methodology refers to three main competences: theoretical, technical and social competences. This distinction builds on the distinction between knowledge, skills and competences in the European Qualifications Framework (EQF) and the European Credit system for Vocational Education and Training (ECVET) (see Box 4 below). The term human capital broadly defined by the OECD as 'the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being' (OECD, 2001:18) captures all three. The use of the term 'capital' leads one to think in terms of investments in education and training which are often necessary in order to acquire skills and knowledge. However, skills and knowledge can also be acquired through work experience, informal on-the-job learning and a variety of other means.

In the actual identification of future competences, the EQF/ECVET definitions are used as indicative. It is noted that the difference between competences and skills is not always clear-cut, for instance where 'soft skills' come into play. A similar comment holds for what determines job or occupational qualifications.[15] Partly because of these

[15] 'Qualification' denotes the requirements for an individual to enter or progress within an occupation. It also denotes an official record (certificate, diploma) of achievement which recognises successful

identification issues, adequate measurement of competences, knowledge and skills is notoriously difficult. In some of the literature, the problem of skills measurement is sometimes avoided by using indicators (proxies) focusing on qualifications (high-level, intermediate-level, low-level) as well as occupations. For the purpose of identifying *future* skill needs such approach will not deliver useful results. Instead it is the knowledge and skills behind that need to be identified.

Rather than producing a full and exhaustive list of all competences for each job function, the key focus in this chapter is on identifying and describing key and critical competences for the future. The description will be focused but also general enough to be meaningful across countries. A slight extension of the original Rodrigues methodology is that together with the identification of critical skills and knowledge needs, a differentiation by scenario is made. Skills and knowledge needs are operationalised as expected key changes in specific skills and knowledge categories by occupation.

Box 4. Definition of competences, skills and knowledge in EQF and ECVET

Several definitions of knowledge, competences and skills are nationally as well as internationally under discussion. Moreover, Member States of the European Union still have different approaches in defining these terms. The European Union has set up a joint process to co-ordinate the different existing terminologies and to find a common basis. Aims of this process are for example to strengthen the mobility of the labour force within the European Union and to facilitate sectoral developments. In the following reference is made to the definition used by the European Qualification Framework (EQF) and the European Credit System on Vocational Education and Training (ECVET).

The EQF links national qualification systems and tries to make vocational training and lifelong learning more transparent and understandable. Therefore a common terminology was developed. The following descriptors are taken from the EQF (European Commission, 2008e; see also European Commission, 2008f):

- *Knowledge* refers to the outcome of the accumulation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual;
- *Skills* refers to the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments);
- *Competence* refers to the proven ability to use knowledge, skills and personal, social and/ or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy;
- *Qualification* refers to a formal outcome of an assessment and validation process which is obtained hen a competent body determines that an individual has achieved learning outcomes to given standards;
- *Learning outcomes* refer to statements of what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and competence.

completion of education or training, or satisfactory performance in a test or examination. The concept of qualification varies from one country to another. It may express the ability – formally defined in work contracts or collective agreements – to perform a certain job or meet the requirements of the workplace. A qualification may give rise to a number of rights and prerogatives which determine the individual's position within the hierarchy of his/her occupational context. (Tessaring, 2004: 235).

Box 5. Skills needs, skills shortages and skills gaps defined

- *Emergent skills needs* are defined here as the change in skills that is needed to adequately fulfil a certain job function in the future. Addressing emergent skills is needed in order to avoid skills shortages and/or skills gaps in the future.
- *Skills shortages* exist where there is a genuine lack of adequately skilled individuals available in the accessible labour market. A skill shortage arises when an employer has a vacancy that is hard-to-fill because applicants lack the necessary skills, qualifications or experience.
- *Skills gaps* arise where an employee does not fully meet the skills requirements for a specific job function but is nevertheless hired. This skills gap needs to be closed through training. Skills gaps can arise where new entrants to the labour market are hired and although apparently trained and qualified for occupations still lack some of the skills required.

Table 13.1 Overview of skills and knowledge clustered by category

Knowledge ('hard skills')
• Legislative / regulatory knowledge (environmental / safety / labour / contracting); Language*; e-skills; Marketing skills; Technical knowledge; Product knowledge; Product development
Social Skills • Team working skills; Social perceptiveness (listening / understanding); Communication; Networking; Language*; Intercultural
Problem-solving Skills • Analytical skills; Interdisciplinary; Initiative, Multi-skilling; Creativity
Self management • Planning; Stress and time management; Flexibility; Multi-tasking
Management skills • Strategic & visionary; Coaching and team building; Change management; Project management; Process optimizing; Quality management; people skills crucial for collegial management style
Entrepreneurial skills • Supplier and customer relationship / understanding; Business understanding; Trend setting / trend spotting

Throughout this report the term *competences* is defined as the "proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study

situations and in professional and personal development." (see Box 4 for definitions). In the practical elaboration of competence needs hereafter the focus is predominantly on knowledge and skills needs, with a further distinction to what is usually described as 'soft skills' such as team working skills, and planning and organising. Note that the 'personal, social and/or methodological abilities' included in the definition of competences (see Box 5) come very close to what is generally understood as 'soft skills'.

A number of different skills categories have been taken into account, including social skills, problem solving skills, (self) management skills, skills related to entrepreneurship, as well as knowledge requirements (sometimes labelled as 'hard skills'). Table 13.1 provides an overview of the different skills and knowledge categories taken into consideration. Literacy and numeracy skills are not specifically mentioned in the tables. In practice these skills cannot be taken for granted. However, they are a prerequisite rather than an emerging skill to participate in the workforce especially in highly regulated and science-based sectors such as chemicals.

For each job function key future skills and knowledge needs were identified. This was done in a workshop with a number of invited sector experts, and validated in two subsequent workshops, including the step 10 final workshop; the results therefore remain based on joint expert opinion. The analysis in Part I and the data tables formed a 'levelling' starting point for each of the discussants. Within the four scenarios (traditional [local] mass production, global mass production, local customisation, and global customisation) presented in chapter 2, the *traditional (local) mass production* scenario offers the least challenging in the context of new skills, while the other scenarios each have their own challenges in new skills. The *global mass production* scenario foresees that furniture manufacturers will operate at global level, with production facilities, design, suppliers, etc. all over the world, either close to the market or close to the availability of natural resources. Global trends in design and fashion have to be incorporated into the production in order to stay competitive. The *local* and *global customisation* scenarios are challenging in the change from mass production towards mass customisation, which is a different business model that asks different technical and social skills from employees at all levels within the furniture production chain.

The emerging future competences are identified and clustered with similar competences in a concise overview table per job function (see next sections 5.2 to 5.13). Only substantive key changes are taken into account, which means that not all cells in the tables are filled. However, if a competence is highlighted in one scenario, but is not addressed in another, this does not mean that the competence is irrelevant in that particular scenario. Rather it means that demand for this competence type in the latter case will not increase substantially within the time frame 2008-2020. Furthermore, it is assumed throughout all scenarios that currently existing REACH and environmental regulations will be implemented.

In the case of the *traditional (local) mass production* scenario, we do not foresee any significant increase in the demand for certain competences. Hence, in the discussion per job function (sections 5.2 to 5.13) this particular scenario has been left out.

The emergent future competences – defined as skills and knowledge needs - are identified and clustered together with similar ones in a concise overview table per job function (see next sections 13.2 to 13.11). Only <u>*substantive key changes*</u> in skills and knowledge needs are taken into account, which means that only part of the cells in the table is 'filled'. However, if a certain skill or knowledge type is highlighted in one scenario, but is not

addressed in another, this does not mean that it is irrelevant. Rather it means that relative demand for this skill in the latter case will not increase within the time frame 2009-2020.

13.2 Managers

Table 5.2 summarizes the emerging skills and competencies that managers in the furniture sector will need under the different scenarios. Those skills and competences coloured black or grey are the ones that are clearly emerging under a particular scenario and may require attention in terms of additional training and adjustments in the curricula of educational establishments. Those skills and competencies coloured black are the ones that are the most critical, followed by those coloured grey.

In many smaller companies, the managers are not considered as a separate category and usually do not have a formal background in management. In most instances they have a technical background and have grown into a managerial position over time through on-the-job training and learning-by-doing. This situation, however, is different in large furniture companies.

Specific skills and competencies that stand out as critical for managers in the furniture sector are:

- Entrepreneurial skills of understanding consumer and supplier needs, for both customisation scenarios. Similarly the focus in these scenarios is on skills for developing new business in addition to managing and optimising of processes.
- Social skills are required for the managers of SMEs, who often grow into the function of manager from a technical background and often lack the right skills for managing other people. Important social skills are networking skills all but the local mass production scenario.
- Analytical skills are needed to identify new technological and consumer trend, as well as to identify new (niche)-markets in the global mass production scenario.
- Globalisation and outsourcing requires more knowledge of global supply chain management, especially for SMEs in order to strengthen their position in the sector.
- Creativity will become for a manager more important for distinguishing the company and companies brand from others. This can also mean the mobilisation of creativity in the company.
- These skills and work requirements in a competitive global environment and a stronger pressure on lower delivery times require managers to handle severe pressures for which time and stress management are crucial to function well over time and require from the manager to be able to act flexible.
- e-skills (ICT related skills and competences) are crucial to operate in a modern business environment, also for managers; there is hence a need for continuously updating e-skills.

Global mass production is the most challenging scenario, necessitating more creativity, planning abilities and marketing skills. In contrast to the *customisation* scenarios, there is a need to distinguish from non-European furniture manufacturers based on design, planning, etc. In the *customisation* scenarios, customer relations skills will become more important. In both global scenarios, social and (inter)cultural skills will become more important. The *local mass production* scenario is more-or-less business as usual, requiring few additional skills and competences.

Table 13.2 Emerging skills and competences of managers in the European furniture sector under different scenarios

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress & time management				
	Flexibility				
	Multi-tasking				
Entre-preneurship	Understanding supplier & customers				
	Business development				
	Marketing skills				
	Trend setting/spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Knowledge	Legislative & regulatory knowledge				
	e-skills				
	Technical knowledge				
Total emerging skills and competences		Count: 1	Count: 16	Count: 7	Count: 16

13.3 ICT professionals

Table 13.3 summarizes the emerging skills and competencies that ICT professionals in the furniture sector will need under the different scenarios. Those skills and competences coloured black or grey are the ones that are clearly emerging under a particular scenario and may require attention in terms of additional training and adjustments in the curricula of educational establishments. Those skills and competencies coloured black are the ones that are the most critical, followed by those coloured grey.

IT professionals in small enterprises often combine this job function with other administrative jobs. These people are responsible for:

- ICT support (logistics, administration, electronic ordering systems shared with suppliers and retailers).
- E-commerce (marketing, public website).
- Specific ICT solutions to sector – modelling / simulation of products in the design phase and the software required for operating the machines and robots in the production process (often part of plant and machinery maintenance and repair workers). `

For the *customisation* scenarios the functioning of a user-friendly website that is adapted for customers to indicate their preferences is necessary for a good functioning business. This requires skills in understanding supplier & customer, necessary e-skills and in the global customisation scenario also intercultural skills. In the mass production scenarios a further decrease of delivery time will become an increasing factor for competitiveness and will require an integration of software systems. Planning, process optimizing and quality management are important skills in the global mass-production scenario.

IT professionals have to deal with people from logistics, management, administration and machine operators and therefore require more and more key soft skills like team work and communication skills.

Table 13.3 Emerging skills and competences of ICT professionals in the European furniture sector under different scenarios

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress & time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding supplier & customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Knowledge	Legislative & regulatory knowledge				
	e-skills				
	Technical knowledge				
Total emerging skills and competences		Count: 5	Count: 10	Count: 11	Count: 14

13.4 Industrial designers

Table 13.4 summarizes the emerging skills and competencies that industrial designers in the furniture industry will need under the different scenarios. Those skills and competences coloured black or grey are the ones that are clearly emerging under a particular scenario and may require attention in terms of additional training and adjustments in the curricula of educational establishments. Those skills and competencies coloured black are the ones that are the most critical, followed by those coloured grey.

Especially in smaller companies, designers are often external employees and have project-based contracts. Larger companies often have their own design departments.

In general the role of industrial designers will be different, depending on the different scenarios. For the global mass-production scenario, the creativity of the designers will be very important for creating unique designs, while for mass-customisation creativity is needed to make designs that are adaptable for customers. Creativity is interpreted as the neessary skills to create unique, distinghuising and innovative designs. In the *customisation* scenarios a stronger service orientation will become more important. In the global scenarios the social and language skills will gain importance.

In the *customisation* scenarios, a close co-operation with the customers will become necessary to establish a workable concept that takes into account individual freedom and the translation into doable products.

In both *mass production* scenario's the necessity for industrial and commercial designers to have creative skills to design distinctive and unique furniture will become more important in order to create a distinctive competence for furniture manufacturers.

E-skills will also become a growing necessity since much of the design work will be computer-based. The introduction of new materials calls for increasing technical knowledge to assess new design opportunities with new materials.

Table 13.4 Emerging skills and competences of industrial designers in the European furniture sector under different scenarios.

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity (and innovation)				
Self management	Planning				
	Stress & time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding supplier & customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Knowledge	Legislative & regulatory knowledge				
	e-skills				
	Technical knowledge (new materials)				
Total emerging skills and competences		Count: 6	Count: 6	Count:: 5	Count: 8

13.5 Production managers

Table 13.5 summarizes the emerging skills and competencies that production managers in the furniture industry will need under the different scenarios. Those skills and competences coloured black or grey are the ones that are clearly emerging under a particular scenario and may require attention in terms of additional training and adjustments in the curricula of educational establishments. Those skills and competencies coloured black are the ones that are the most critical, followed by those coloured grey.

In general it can be said that the production manager is one of the functions that requires many different skills. In the future, even more additional skills are foreseen to become important for the production manager.

In all scenarios the shift from handicraft to machine and robot manufacturing will ask for a different inpu t from the production manager, who needs to understand the characteristics of the manufacturing process in order to make a detailed work plan based on the design from the commercial designer. Since the production manager needs to communicate well with designers and production employees (machine operators and skilled handicraft people), this person needs to have communication, networking and team working skills. For production managers the planning of suppliers and the understanding of customers is of growing in importance. With more attention paid in all scenarios towards the production time and effeciency, additional management skills like project management, process optimizing and quality management will become more important for the project manager. Also the e-skills will become very relevant in each scenario since production manager will increasingly use computer-based systems to execute their planning.

For the *customisation* scenarios the production manager will face more criteria that a furniture design has to fulfil in order to be adaptable for customisation by customers.

Table 13.5 Emerging skills and competences of production managers in the European furniture sector under different scenarios

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress & time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding supplier & customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Knowledge	Legislative & regulatory knowledge				
	e-skills				
	Technical knowledge				
Total emerging skills and competences		Count: 10	Count: 23	Count: 20	Count: 24

13.6 Accounting and finance professionals

Table 13.6 summarizes the emerging skills and competencies that accounting and finance professionals in the furniture industry will need under the different scenarios. Those skills and competences coloured black or grey are the ones that are clearly emerging under a particular scenario and may require attention in terms of additional training and adjustments in the curricula of educational establishments. Those skills and competencies coloured black are the ones that are the most critical, followed by those coloured grey.

Small companies often outsource the accounting and finance jobs, while medium-sized and large companies usually have their accounting and finance staff. In the larger firms the accounting and finance professionals may have to deal with a more complex flow of contracts and payments, considering the increase in the use of different materials and therefore different suppliers. For the global scenario's the accounting and finance professionals have to deal with clients, retailers and suppliers from many different countries, which require additional communication, language and intercultural skills as well as an understanding of different legal and regulatory systems. Furthermore, the use of more sophisticated software and the integration and standardisation of Enterprise Resource Planning-software (ERP) with electronic administration, invoicing into standardised software will require additional e-skills under all scenarios. Also in the *customisation* scenarios the communication with customers will grow in importance, which will increase the importance of soft skills and understanding customer's skills for accounting and finance professionals. In all scenarios the communication with suppliers and customers will become more important due to an increase in the diversification of resource materials. Also the use of e-skills and the understanding of relevant laws and regulations of other countries will become more important, not only in the global scenarios but also in the local scenarios in which the buying of raw materials will become more a global issue.

Table 13.6 Emerging skills and competences of accounting and finance professionals in the European furniture sector under different scenarios

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress & time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding supplier & customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Knowledge	Legislative & regulatory knowledge				
	e-skills				
	Technical knowledge				
Total emerging skills and competences:		Count:5	Count:10	Count: 6	Count: 10

13.7 Sales and marketing professionals

Table 13.7 summarizes the emerging skills and competencies that sales and marketing professionals in the furniture industry will need under the different scenarios. Those skills and competences coloured black or grey are the ones that are clearly emerging under a particular scenario and may require attention in terms of additional training and adjustments in the curricula of educational establishments. Those skills and competencies coloured black are the ones that are the most critical, followed by those coloured grey.

The sales and marketing staff are responsible for managing customer relations, marketing the products and managing sales activities. In the globalisation scenarios the sales and marketing professionals require strong language and intercultural skills. In addition, sales and marketing work requires high level social skills to engage in extensive contacts with external parties such as customers or service providers. These social skills are part of the set of soft skills that are required in most professional jobs such as team working, communication, networking, language and intercultural skills in addition to flexibility, creativity, multi-tasking and project management skills. Especially in the mass-customisation scenarios the understanding customers is very important for marketing and sales to offer the right conditions for customers to customise and design their own product. For the mass-production scenarios it is important for the sales and marketing professionals to understand the customer wishes in order to know what kind of mass-produced furniture is wanted and what the new consumer trends are. With increasing market segmentation and niche markets emerging in the scenarios, entrepreneurial skills such as spotting of market trends and opportunities become increasingly important.

While sales and marketing is not a science but an art, it is mostly learned through learning on the job. Specific knowledge requirements relate to:

- Product knowledge, especially the technical understanding of products, in order to be able to serve clients.
- E-skills and particularly e-business skills as for most professional jobs are crucial and need to be up-to-date. Sales and marketing staff frequently works with specific IT programmes to manage client relationships / communication.

In general, creativity and the taking of initiative will be of relevance due to a general up-scaling of marketing innovations by all competitors. Internet-based sales, advertising and marketing will become standard, providing more opportunities for original concepts and strategies. Especially the Internet as a commercial platform necessitates creative marketing concepts due to fierce global competition in the global scenarios. Although some experts doubt whether consumers will in the future buy furniture online, some new furniture manufacturers have already set up an online sales websites that sells furniture products, including seats and sofa's globally and online. Especially for the lower value added markets this might in the future become an important way for gaining sales and asks different skills of sales and marketing professionals in furniture manufacturing firms..

Technical knowledge may also become more important for marketing because of the development of new materials, new concepts and innovations whose advantages have to be explained to the customers.

Table 13.7 Emerging skills and competences of sales and marketing professionals in the European furniture sector under different scenarios

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress & time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding supplier & customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Knowledge	Legislative & regulatory knowledge				
	e-skills				
	Technical knowledge				
Total emerging skills and competences		Count: 7	Count: 17	Count: 10	Count: 15

13.8 Supply chain managers

Table 13.8 summarises the emerging skills and competencies that supply chain managers in the furniture industry will need under the different scenarios. Those skills and competences coloured black or grey are the ones that are clearly emerging under a particular scenario and may require attention in terms of additional training and adjustments in the curricula of educational establishments. Those skills and competencies coloured black are the ones that are the most critical, followed by those coloured grey.

The supply chain manager increasingly in all scenarios will need social skills in order to organise the supply chain, which increasingly will become more fragmented. In the global scenarios additional social skills like language and intercultural will be necessary for supply chain managers. For all scenarios the supply chain manager will need good planning skills to be able to match and time the supply of natural resources with the production process. Additional technical knowledge about a wider range of materials will be needed in order to assess the quality of raw materials. Furthermore, stricter environmental and social regulations concerning the use of natural resources will require from the supply chain manager up-to-date legislative and regulatory knowledge. E-voicing, administration and e-business require in all scenarios necessary e-skills. In the mass production scenario's the competitive advantage of furniture firms will partly depend on a good organisation of the supply-chain, demanding also creativity from the supply-chain manager as well as flexibility.

Table 13.8 Emerging skills and competences of supply chain managers in the European furniture sector under different scenarios

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social Skills	Team working skills	■	■	■	■
	Social perceptiveness	■	■	■	■
	Communication	■	■	■	■
	Networking	■	■	■	■
	Language		■		■
	Intercultural		■		■
Problem solving skills	Analytical skills	■	■	■	■
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity		■		■
Self management	Planning	■		■	■
	Stress & time management				
	Flexibility		■		■
	Multi-tasking				
Entrepreneurship	Understanding supplier & customers	■	■	■	■
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management	■	■	■	■
Knowledge	Legislative & regulatory knowledge	■	■	■	■
	e-skills	■	■	■	■
	Technical knowledge	■	■	■	■
Total emerging skills and competences		Count: 11	Count: 14	Count: 11	Count: 15

13.9 Administrative support staff

Table 13.9 summarizes the emerging skills and competencies that administrative support staff in the furniture industry will need under the different scenarios. Those skills and competences coloured black or grey are the ones that are clearly emerging under a particular scenario and may require attention in terms of additional training and adjustments in the curricula of educational establishments. Those skills and competencies coloured black are the ones that are the most critical, followed by those coloured grey.

Support staff should be understood here as being in support of all other job functions and to improve work effectiveness. The category of support staff is defined here to include all other support job functions than the ones that have already been described and not requiring tertiary education. Most support staff functions are administrative related jobs. Key knowledge required for these activities are up-to-date e-skills to function effectively in an administrative environment (basic Internet skills; spreadsheet and word processing skills; e-monitoring skills).

In addition, a number of social skills is crucial to perform support functions in an organisation well, especially team working skills and communication skills. Both will become increasingly important in project driven environments. Project driven environments require self-initiative to work independently, good planning, multi-tasking and stress & time management. In international organisations also for support functions language and intercultural skills become increasingly important.

While there is little difference in skills needs between the sub-sectors as support staff comprises tasks generic to the sector, nevertheless a basic technical understanding of the products is beneficial for people seeking employment in the sector. Furthermore, there is a change that much of administrative work may become outsourced or will be automated due to the application of advanced and sophisticated software.

Especially in global scenarios, language and communication skills as well as flexibility will become more important for administrative support staff. Due to expected increases in safety and environmental regulations, improved legal knowledge will add as an upcoming skill for administrators.

Especially in global settings the function of supply chain manager will generally get more important. Independent of the scenarios, the manufacturing of furniture is not a local, but a global process where materials and production are organised internationally, depending on the optimisation of prices and material availability. In the future more and more different materials will be used and applied in the furniture industry, including the application of high-tech materials as well as the addition of intelligence to furniture (sensors and ICT). This will require more technical knowledge of the supply chain managers, as well as communication, networking, language and intercultural skills.

The understanding of customers and suppliers is of much relevance and especially global scenarios require a high degree of flexibility.

Knowledge about legal issues and regulations will generally become more important due to new and stricter rules, e.g. in regard to environmental and safety aspects. The same applies for a certain degree of technical knowledge when it comes to innovations and the use of new materials and product components. In the local scenarios the higher use of local materials is expected, to give products a more local (and sometimes also an eco-friendly) image.

Table 13.9 Emerging skills and competences of administrative support staff in the European furniture sector under different scenarios

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress & time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding supplier & customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Knowledge	Legislative & regulatory knowledge				
	e-skills				
	Technical knowledge				
Total emerging skills and competences		Count: 4	Count: 9	Count: 4	Count: 9

13.10 Plant and machinery maintenance and repair workers

Table 13.10 summarizes the emerging skills and competencies that plat and machinery maintenance and repair workers in the furniture industry will need under the different scenarios. Those skills and competences coloured black or grey are the ones that are clearly emerging under a particular scenario and may require attention in terms of additional training and adjustments in the curricula of educational establishments. Those skills and competencies coloured black are the ones that are the most critical, followed by those coloured grey.

Many of the tasks of plant and machinery maintenance and repair workers will be performed by the builder of the machinery or will be outsourced to service providers. The large furniture manufacturer will employ maintenance and repair workers who will be responsible for the daily routine and small repair and maintenance functions, where the large repair and maintenance functions will be outsourced to service providers.

In the future more sophisticated machines and autonomous robots will be used in the furniture industry, which will be more operated based on advanced software. This requires from the maintenance and repair workers more advanced e-skills, ICT knowledge. In general, machinery will become more multifunctional and complex, necessitating higher technical and analytical skills in general.

For the mass production or mass-customisation a good planning of maintenance and repair of machines will become more important. Since a less labour intensive manufacturing process will likely to be a continuous process, day and night, the maintenance and repair of machines has to be time efficient and keep the interference with production process at a minimum.

The plant and machinery maintenance and repair workers in all scenarios require good communication skills and additional process optimizeing and quality management skills in working together with production managers, the skilled handicraft workers and eth machine operators. The maintenance and repair workers need to understand the encountered problems on the workfloor and have to control that the process will be optimized and according to the required quality standards.

Table 13.10 Emerging skills and competences of plant and machinery maintenance and repair workers in the European furniture sector under different scenarios

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress & time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding supplier & customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Knowledge	Legislative & regulatory knowledge				
	e-skills				
	Technical knowledge				
Total emerging skills and competences		Count: 7	Count: 10	Count: 7	Count: 10

13.11 Skilled handicraft workers

Table 13.11 summarizes the emerging skills and competencies that skilled handicraft workers in the furniture industry will need under the different scenarios. Those skills and competences coloured black or grey are the ones that are clearly emerging under a particular scenario and may require attention in terms of additional training and adjustments in the curricula of educational establishments. Those skills and competencies coloured black are the ones that are the most critical, followed by those coloured grey.

In all scenarios the number of skilled handicraft workers will decrease, due to the increase of automation and robotisation. For skilled handicraft workers, the use of more sophisticated and automated tools to facilitate their handicraft will increase, asking for more different technical skills in operating these tools. In the future, the borders between handicraft workers and machine operators may blur, requiring from the handicraft workers multi-skilling capabilities and more e-skills. Due to a further expected increase in the use of different materials, handicraft workers need to broaden their knowledge about materials to many new materials and applying interdisciplinary skills. In small traditional furniture manufacturing organisations many skilled handicraft workers have extensive knowledge about the treatment of wood and the manufacturing of furniture out of different types of wood. With the use of plastics, bamboo, concrete, glass and many different materials new knowledge and skills in how to treat these materials is necessary.

For all scenario's a further rationalisation of the production process is expected, requiring from the skilled handicraft worker planning skills and additional project management, proces optimizing and quality management skills.

In the customisation scenarios it will be important to translate the customer wishes into the desired product, which necessitates flexibility and creativity from a more analytical perspective.

Table 13.11 Emerging skills and competences of skilled handicraft workers in the European furniture sector under different scenarios

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress & time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding supplier & customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Knowledge	Legislative & regulatory knowledge				
	e-skills				
	Technical knowledge				
Total emerging skills and competences		Count: 10	Count: 14	Count: 14	Count: 16

13.12 Machine operators

Table 5.12 summarizes the emerging skills and competencies that machine operators in the furniture industry will need under the different scenarios. Those skills and competences coloured black or grey are the ones that are clearly emerging under a particular scenario and may require attention in terms of additional training and adjustments in the curricula of educational establishments. Those skills and competencies coloured black are the ones that are the most critical, followed by those coloured grey.

Automation and robotisation will also increasingly enter the furniture manufacturing industry. This applies to large companies, but until 2020 also a growing number of SMEs will increase the application of automation and robotisation. With the increase of competition from Asia (mainly China) and possibly European countries east of the EU (e.g. Ukraine and Belarus) a further cost reduction for low-added-value furniture is possible with the replacement of expensive labour with low-cost machines. Also the countries in Central and Eastern Europe inside the EU that now have a competitive advantage due to low labour cost, will face increases in wages. For mass customisation scenarios the use of software controlled machines that can make unique designed furniture at mass-production is necessary. In these scenario's the machine operators will need team working skills and communication skills to communicate with handicraft workers and the Production manager for the successful customisation of each product (in case this is not fully automated).

For all scenario's the machine operators require multi-skilling skills in order to operate the technical machines, including handling and operating the software of the machines, the hardware of the machine and the process of manufacturing itself. Due to a further rationalisation of the production process, other skills like process optimising, quality management, stress & time management and planning skills will become more important for machine operators in all scenarios.

Since machines will get more ICT-based and more complex. This will necessitate more information-based than manual skills. E-skills and technical knowledge will grow in importance. It is also likely that fewer people will control a growing number of machines and that programming skills will become central.

For all scenarios the borders between ICT professionals, handicraft workers and machine operators may blur, necessitating more multi-skilling.

Table 13.12 Emerging skills and competences of machine operators in the European furniture sector under different scenarios

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress & time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding supplier & customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Knowledge	Legislative & regulatory knowledge				
	e-skills				
	Technical knowledge				
Total emerging skills and competences		Count: 9	Count: 11	Count: 11	Count: 13

13.13 Labourers

Low-educated workers still make up a significant part of the workforce in the sector; they have been, however, the biggest loser in terms of employment in the recent past. The number of production labourers in this sector is diminishing in Europe, as most of the simple production activities have moved outside Europe or have been replaced by machines. Future employment opportunities for this type of workers will be in up-skilling towards future skill requirements of metal and machinery workers as well as skilled handicraft workers and machine maintenance and repairers. Labourers active in cleaning and maintenance will increasingly see their job outsourced to third party service providers; therefore, this type of job function will shift to the service sector.

New knowledge requirements for (low skilled) labourers (in contrast to the skilled handicraft workers discussed above) for all scenarios include the capacity to deal with (environmental) regulations and safety requirements. In the two globalisation scenarios there is a need for languages, and e-skills. The same applies to the need for flexibility and analytical skills, with the latter especially important in the customisation scenarios. In all scenarios there is a need for strengthening quality management.

Table 13.13 Emerging skills and competences of labourers in the European furniture sector under different scenarios

Skill category	Skills	Mass production		Customisation	
		Local	Global	Local	Global
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress & time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding supplier & customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic & visionary				
	Coaching & team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Knowledge	Legislative & regulatory knowledge (safety)				
	e-skills				
	Technical knowledge				
Total emerging skills and competences		Count: 2	Count: 5	Count: 6	Count: 8

13.14 Summary

Both the quantitative and qualitative implications for jobs and skills for each of the scenarios are summarised in Table 13.14. The volume changes have been taken from Table 12.1 and the skills and competences changes from the last row of Tables 13.2-13.13. Table 13.14 shows that the largest change in volume and skills and competences occurs under the *global customisation* scenario followed by the *local customisation* scenario. The *traditional (local) mass production* scenario will result in a stagnation/decline for most jobs categories and less demand for new skills and competences than under the other scenarios.

Table 13.14 Summary of quantitative and qualitative changes per job category under different scenarios

Job category	*Scenarios*							
	Local mass production		***Global mass production***		***Local customisation***		***Global customisation***	
	Volume change	**Change in skills**	**Volume change**	**Change in skills**	**Volume change**	**Change in skills**	**Volume change**	**Change in skills**
Managers	M	1	M/I	16	I	7	I	16
ICT professionals	M/I	5	I	10	M	11	I	14
Industrial designers	M	5	M/I	12	I	11	I	14
Production managers	M	10	I	24	M	21	I	24
Accounting and finance professionals	M	5	M/I	10	M	6	M	10
Sales and marketing professionals	M/I	7	I	16	I	11	I	14
Supply chain managers	I	11	I	16	M/I	11	I	16
Administrative support staff	M	4	M	9	M	4	M	9
Plant and machinery maintenance and repair workers	M/I	7	I	10	M/I	7	I	10
Skilled handicraft workers	D	10	D	8	M/D	8	M/D	10
Machine operators	M	6	M	13	M/I	14	M/I	15
Labourers	D	NA	D	NA	D	NA	D	NA

Notes: D =decrease, I=increase, M=maintain. In total 29 different skills and competences were identified in this study.

Part III.

Available Options to Address Future Skills and Knowledge Needs, Conclusions and Recommendations

Part III. Available Options to Address Future Skills and Knowledge Needs and Recommendations - Guide to the reader

In the final third part of this report, a range of main strategic options ('choices') is reviewed, including possible actions in education and training. The report concludes with a number of conclusions and recommendations for the sector (individual firms, sector organizations, others) and policy-makers at various levels, ranging from the EU to the local level. Part III reflects steps 7 (Main strategic choices), 8 (Main implications for education and training) and 9 (Main recommendations) of the common methodology. Its contents are as follows: Chapter 14 highlights the various strategic choices in response to future skills and knowledge needs. Chapter 15 focuses on specific implications for education and training. Chapter 16 concludes by providing a number of key recommendations and conclusions.

14 Strategic choices to meet emergent skills and knowledge needs

14.1 Introduction

This chapter identifies the main strategic choices to meet the skills and knowledge needs identified (step 7). It provides a framework to pick and select the most relevant strategic choices – i.e. solutions to meet future skills and knowledge needs - available. Strategic choices refer and relate to the medium- and longer term, even though emerging skills needs in practice may also apply to the now and tomorrow. Essential in seeking appropriate solutions is to keep this longer time perspective in mind. Rather than focusing on one single solution, a set of linked strategic choices will in most cases be the best strategy to follow. Prioritising both in time (what first, where to follow up) and in allocation of resources (budgetary focus) followed by further fine-tuning is a clear necessity to guarantee that skills needs are targeted and solved. Skill needs can be identified at various levels, ranging from assessments at the national or even European sector level - which are by nature rather general - to more precise assessments at the regional and company level. Especially for large enterprises not only the identification of skills needs but also the search for adequate solutions will be an integral part of an overall longer-term business strategy. Some solutions will be found within the company itself, for instance by reorganising functions within or between plants, by offering (re)training trajectories and by active global sourcing of personnel. For SMEs and especially for micro-enterprises[16] such longer-term, more strategic human resource management often will be more difficult to organise and operationalise. It should be emphasized that at all possible levels identified different actors need to act to address skills needs and offer solutions and preferably also in close concert. These can be individual firms, organised interests at the sector level (employers and employees), but also others. Local, regional and national governments have also a important role to play. This chapter offers first of all a better insight in the 'menu' of possible strategic choices (section 14.2). It also provides for a framework that can identify skills needs at the appropriate level and helps to decide which should be the actual choices to be made (see section 14.3). This framework is subsequently applied to the furniture sector (section 14.4).

14.2 Possible strategic choices

The possible strategic choices contained in this chapter refer to the strategic choices originally proposed by Rodrigues (2007: 42) as well as a number of other, additional choices. Whereas *strategic* choices mostly refer to the medium and longer term, most of the choices mentioned can also be implemented in the short run, to 'mend' existing skills shortages and/or skills gaps. Each of the solutions at hand differs in whether or not it can resolve direct skills shortages and/or gaps. A longer term horizon, however, means that there is possibility of adapting, steering and fine-tuning the available solutions towards a more optimal allocation of skills supply and demand. In view of the time horizon, the period up to 2020, the strategic choices and instruments with a more long-term impact

[16] Defined as firms with less than 10 employees.

especially need to be addressed. Identification of possible solutions obviously is not enough. Concrete initiatives, policy and strategic decisions need to be taken at all appropriate levels with each actor having a different responsibility and a different role to play.

Strategic choices to meet future skills needs need to be taken by a number of actors and at different levels (firm, local, regional, national, sectoral). For obvious reasons, firms are an important player in finding solutions for the skills needs – both in volume (skills shortages) and in matching any existing skills gaps. Companies avail of a number of options to meet their skills needs. These include:

A. Recruiting workers from other sectors
B. Recruiting workers from other Member States
C. Recruiting workers from non-Member States
D. Recruiting unemployed workers with or without re-training
E. Recruiting young people coming from the education system, with or without re-training (first job recruits)
F. Training employed workers
G. Changing the work organisation (including network collaboration and mergers)
H. Outsourcing and offshoring.

Sectoral organisations, educational institutions and governments also have a role to play. They will be the prime actors in addressing the following options:

I. Changing general and vocational education
J. Designing and offering new courses (continuing vocational education and training)
K. Providing information about jobs and (emerging) skills: career guidance; updating job profiles regularly.
L. Improve the image of the sector (joint action of companies together)
M. Stronger cooperation with the industry (internships, company visits for participants in education, image improvement).

A more detailed description of these strategic options can be found in annex III. Whether these strategic options are feasible and viable depends on a number of factors. In order to discuss and select from the available list of strategic options, one should first - as described in the introduction - know whether and when skills needs are indeed likely to arise, both in quantitative (number of job functions) and in qualitative terms (what knowledge and skills). An important question that needs to be addressed first is <u>at what level</u> and <u>to whom</u> the skills needs question applies. Obviously for an individual firm different information is required for identifying these needs and taking the right action than for a national ministry or a training institute.

The identification of possible strategic choices would in principle require extensive and detailed future analysis at the Member State and preferably also the regional level of skills and knowledge demand and supply patterns by job function and sub-sector, in a similar way and along the steps provided by the methodology of this study so far. The methodology and step-wise approach followed are applicable at the national and regional level of analysis. Ideally, these results should be complemented by the results of labour

market model forecasts to corroborate results. Such an analysis would also need to include an assessment of the numbers and skills composition of currently being educated, i.e. an assessment of all cohorts of primary, secondary and tertiary pupils and students (and their skills potential) currently in the educational system and arriving at the labour market in the oncoming years. It would need a thorough assessment of the current educational and training system itself, including the already decided changes herein for the oncoming years, to see whether the system as it is now in place is able to satisfy the prevailing and future new skills demands both in terms of numbers of new potential recruits and in terms of skills and knowledge.

14.3 Matching future skills and knowledge needs by making the right choices

In order to address the identified future skills and knowledge needs in an encompassing and timely manner, appropriate joint action is needed by all stakeholders, including the industry (firms, sector organisations and social partners), training and education institutes, intermediary organisations and, last but not least, government at all levels (EU, national, regional and local). Collaboration and co-operation between stakeholders will be needed, at all decision-making levels, in order to agree on and implement a package of feasible solutions. In order to prepare for this, timely, targeted and reliable information is essential.

This section presents a targeted short-cut strategic options decision tool to enable and support decision-makers in making the right (mix of) choices, supported by appropriate and reliable information on actual needs, possible choices and stakeholders to be involved. The strategic options decision tool is aimed to provide answers and solutions at the job function level and consists of a shortlist of a number of key questions - a concise menu of choice -, with answers providing decision-relevant information about the need and viability of available options. The questions need to be answered at the national, and where relevant at the regional level so as to map and identify the specific sector needs. The decision tool can also be used at the level of the firm. New job function information (e.g. new upcoming functions) can be added where thought relevant.

The key question list – consisting of six ‘framing’ questions, followed by option-specific questions - should be filled in for each job function. The ‘framing’ questions constitute a summary of main expected quantitative and qualitative skills needs developments. The filling in of the list should, however, only be done on the basis of an informed discussion between several stakeholders involved, representing together an informed body of knowledge on the various aspects at stake, including labour market developments and prospects at the sub-sector level, skill and knowledge requirements at job function level and developments in and make up/orientation of the educational and training system.

Key questions for identifying skills and knowledge needs

Question 1. Is the demand for workers expected to decrease or increase between now and 2020? (both related to market prospects and replacement demand due to ageing)

If decreasing, there is probably less need for recruiting workers from other sectors and (non-) Member States and less need for recruiting unemployed.

If increasing, analyse whether less radical options are enough to meet demand or whether options should be chosen like recruiting workers from other sectors and (non-) Member

States and recruiting unemployed. *[Note: see Table 12.1 for estimated volume effects per scenario.]*

Question 2. Are the required qualitative skills expected to be rather stable between now and 2020?

If there are not many changes in required skills and knowledge, there is probably no need to apply many strategic options. Please focus on the options that are most effective.

If many skills and knowledge categories are changing, there is probably a need to apply many strategic options. Create a package of strategic options to meet skill needs. *[Note: see Table 13.2 and following for the number of competences changing per job function per scenario.]*

Question 3. Do SMEs and especially small companies (including micro enterprises) play a large role in the sector?

If yes, several options (like recruiting) are less viable for companies themselves as it is often difficult for small companies to organize this. If this is the case, sector organisations or intermediary organisation might play an important role in helping to match supply and demand. Another solution could be found in changing the work organisation. Through cooperation or mergers, for instance, the relevant scale can be increased which makes it easier to use these options. The same holds, more or less, for the organisation of training and re-training. Larger (associations of) companies have less difficulties to organise this and the need for support from other actors is lower. *[Note: see Table 3.7 for number of firms per size class.]*

Question 4. Are companies in general active on Member State level, EU level or global level?

Companies who are active on a larger regional level will have, in general, more opportunities to use the option of recruiting workers from other Member States (for companies active at the EU level) and the option recruiting workers from non-Member States (for companies active at the global level). The same holds for the option offshoring. *[Note: see chapter 3]*

Question 5. Are workers in a job function in general low-educated?

If yes, training is less easy to implement as a viable option as difficulties arise in organising this, while the need for training might be even higher. *[Note: see Table 3.8 to 3.11, for education shares]*

Question 6. Are workers in a job function in general old (i.e. older than the average age in the subsector and compared to other sectors)? *[Note: see section 3.3, for age structure.]*

If yes, training is less easy to implement as a viable option as difficulties arise in organising this and less new knowledge endogenously enters the companies, while the need for training might be even higher.

Key questions for identifying suitable options and relevant acting stakeholders

The six questions form the first part of the short-cut approach. The second part discusses the viability of strategic options to tackle and solve emergent skills and knowledge needs for each of the job functions identified. It confronts the list of available strategic options with the analysis of quantitative and qualitative developments on headlines based on the preceding six questions. For each job function identified an assessment is made on

whether the available strategic options are relevant or not, and who should be prime actors to change the current situation into a more favourable direction. If the strategic option is considered relevant, a “yes” is filled in, else a “no” is included. If the strategic option is dependent on specific characteristics of the sub-sector or components thereof, this is included in the table. For example, if recruiting workers from other Member States is only an option for large companies a “Yes, but only for large companies” will be included. Characteristics that are dealt with in the table are based on the six question analysis, representing:

- The change in volume (as a reference we include the most difficult scenario, which is often the scenario with the largest increase)
- The change in skills (as a reference we include the most difficult scenario, which is often the scenario with the largest change in skills and knowledge needs)
- Education level
- Age of the workforce
- Scale of the company and region the company is working in.

In principle, the following tables can be made scenario-dependent. In the descriptions below, the Global Customisation scenario has been taken as the point of reference as the most demanding and dynamic in terms of up-skilling, knowledge upgrading and change.

14.4 Managers

Table 14.1 presents viable strategic options for emerging skills and competences of managers in both *mass production* scenarios and both *customisation* scenarios for the furniture sector.[17] While there is an increase in the number of managers expected under both customisation scenarios, also skill and competence shortages are expected in this occupational function (see chapter 5). What have been detected are current skill and competence gaps.

In principle, almost all listed strategic options are viable to meet the emerging skills needs of managers. Some are more probable than others, however. Viability depends on firm size and identified skills needs. Recruiting managers from other sectors for instance is a more viable option for larger companies than for SMEs. For SMEs operating locally, more company- and region-specific skills are needed. For larger companies operating globally more generic managerial skills are needed as well as intercultural skills, making recruitment from other sectors (in different 'cultures') a more viable option. One problem facing attracting people from other sectors for all job category is the image of the sector. Like several other traditional manufacturing sectors, furniture seems to have a slightly negative image in attracting new employees with generic skills (e.g. managers, sales and marketing, accounting & finance etc)

Some experts in the sector consider recruiting managers from other sectors a viable option in order to gain fresh ideas and new strategic visions for the companies in a fast changing business environment. However, in most small businesses that produce for the local market the owner is also the manager. For these reasons, the recruitment of workers from other sectors, other member states or other non-Member States are viable strategic options only for the larger companies, but not for SMEs in the furnishing sector. Recruiting unemployed presents seems not to be an option for companies.

The recruitment of young people from the education system and training or re-training of the existing workforce presents viable strategic options for all companies. Training and re-training is an adequate method to cope with the emerging skill gaps provided that the overall workforce in the occupational function 'managers' is expected to level off or to decrease. The training content differs slightly due to the emerging needs in the different sectors and size of companies. Social skills like communication and networking skills are highly needed. This also holds for language and intercultural skills, mainly in the global customisation scenario. Training for an ageing group of managers is an important strategic choice.

Changing the work organisation, e.g. inter-disciplinary team work, is a viable option for meeting the emerging skills demands in global customisation. Outsourcing and off-shoring is a plausible option for larger companies in the globalisation scenarios GMP and GMC.

Designing and offering new courses is a necessary and viable option to meet the demand for skills and competences for managers in the future. On the one hand the availability of courses, especially for SMEs, has to be improved; on the other hand courses should refer strongly to the needs of the furniture industry.

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[17] Where significant differences are expected in strategic choices between the sub-sectors these will be included in the text and accompanying Table.

Table 14.1 Strategic options managers

Questions	Answers	
1. What is the maximum volume effect? 2. What is the maximum change in skills? 3. Do SMEs play a large role? 4. Is the sector national/EU/global? 5. Is the workforce old? 6. Is the workforce low educated?	Increase (longer term maintain in GMP) 16 Yes Global (except LMC) Yes (in EU-15); younger in EU-12 Yes	
Options	**Is this option viable?**	**Actors***
A. Recruiting workers from other sectors	Yes, mainly for generic managerial skills (GMP and GC), Less viable for LC (more specific managerial skills needed)	C, S, I
B. Recruiting workers from other Member States	Yes, mainly in GMP and GC, less viable in LC; often language barrier	C, E, G, I
C. Recruiting workers from non-Member States	Yes, mainly in GMP and GC, less viable in LC; often language barrier	C, E, G, I
D. Recruiting unemployed with or without re-training	Only in rare cases	C, I
E. Recruiting young people from the education system	Yes, e.g. through apprenticeships	C, S, E
F. Training and re-training employed workers	Yes, in-house promotion and further training in the firm	C, S, E
G. Changing work organisation	Yes, GC mainly ICT & logistics driven (Supply Chain Management)	C
H. Outsourcing and off-shoring	Yes, only for large companies in GMP and GC.	C
I. Changing vocational education	Yes, networking, communication, language and intercultural management	S, E
J. Designing and offering new courses	Yes, networking, communication, language, intercultural management, also e-skills and logistics (SCM). In GMP and GC knowledge regarding foreign regulation and legislation.	C, S, E
K. Providing information about emerging skills	Yes, to inform (new) employees about the required skills	C, S
L. Improve the image of the sector	Yes, needed to recruit employees	C, S, E, U, G, I
M. Stronger cooperation between stakeholders	Yes, including stronger cooperation with all stakeholders	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.5 ICT professionals

Table 14.2 shows the strategic options for emerging competences of ICT professionals. In the three scenarios an increase of this occupational function is expected. Hence, in general, all strategic options are within reach to meet the demand for this occupational function. In the mass production scenario, the role of ICT professionals will be less different than today, whereas the global character of the situation will call for more intercultural and language skills.

The recruitment of workers from other sectors is a viable option since also generic ICT skills are required for ICT networks, ICT support, maintenance and service. Professionals specialised in programming and data processing are less likely to be recruited from other sectors due to the sector-specific knowledge and programming skills. This will only be a feasible option in combination with a sector-specific training. This is also the case for engineers. They could be recruited from other sectors due to their general knowledge in mechanics and electronics, but will need specific training on the sector-specific technical equipment. Recruiting members from other and non-Member States is a viable option provided that the language gap can be bridged. Due to an expected European-wide skill shortage these are strategic options mainly in reach for larger companies and Member States with a relative high wage level.

The recruitment of unemployed seems to be a viable option only in combination with sector specific training. In addition, this strategic option will be limited in scope due to the small numbers of unemployed ICT professionals and engineers. Recruiting young people from the education system is another viable option to meet the skill gaps and shortages for ICT professionals as well as engineers. A particular focus should be directed towards attracting female workers to this occupational function in the sector, which is still dominated by a male workforce. In order to overcome existing and emerging skill gaps within this occupational function continuous or life long training is necessary.

Table 14.2 Strategic options ICT professionals

Questions	Answers	
1. What is the maximum volume effect? 2. What is the maximum change in skills? 3. Do SMEs play a large role? 4. Is the sector national/EU/global? 5. Is the workforce old? 6. Is the workforce low educated?	Increase 14 Yes Global (except LC) No No	
Options	**Is this option viable?**	**Actors***
A. Recruiting workers from other sectors	Yes (mainly from industrial sectors).	C, S, I
B. Recruiting workers from other Member States	Yes, mainly in GMP and GC in order to obtain intercultural skills. Less viable in LC.	C, S, E, G, I
C. Recruiting workers from non-Member States	Yes, mainly in GMP and GC in order to obtain intercultural skills. Less viable in LC.	C, S, E, G, I
D. Recruiting unemployed with or without retraining	Yes, but only with retraining. Operating systems and programming languages change fast, especially GC and LC.	C, E, I
E. Recruiting young people from the education system	Yes, ICT skills (knowledge) readily available. Competition is fierce.	C, E
F. Training and re-training employed workers	Yes, but difficult for older workers (lacking ICT based education/ affinity).	C, S, E
G. Changing work organisation	Yes, extending corporation in supply chain, in GMP and GC.	C, I
H. Outsourcing and off-shoring	Yes, in house ICT support can be outsourced mainly in LC and GMP, off-shoring mainly in GC.	C
I. Changing vocational education	Yes, integrating ICT skills and intercultural and language skills (e.g., understanding international suppliers and customers). LC and GC web-based, customer-driven production and logistics.	C, S, E
J. Designing and offering new courses	Yes, intercultural and web-based, customer-driven development/ production and logistics	C, S, E
K. Providing information about emerging skills	Yes, to inform (new) employees about the required skills	C, S
L. Improve the image of the sector	Yes, needed to recruit employees	C, S, E, U, G, I
M. Stronger cooperation between stakeholders	Yes, including stronger cooperation with all stakeholders	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.6 Industrial designers

Especially in smaller companies, designers are rather external employees or have project-based contracts. Larger companies can have their own design departments. Creativity and service orientation will become more important skills for the industrial designer, but also social and language skills will become more important, especially in both the globalization scenarios.

In the *customisation* scenarios, a close co-operation with the customers will become necessary to establish a workable concept that takes into account individual freedom and the translation into doable products. E-skills will also become a growing necessity since much of design work will be computer-based. The introduction of new materials calls for increasing technical knowledge to assess new design opportunities with new materials.

Table 14.3 shows the strategic options for the furniture sector to provide oneself with these needed skills. Recruiting designers from other sectors is a viable option. In contrast to other job functions, industrial designers are very eager to work for the furniture industry, since furniture is a popular sector to design for and furniture projects are essential for the credentials of designers. Recruiting designers from other Member or non-Member States certainly is a viable option, as is recruiting unemployed and young people from the education system. However, one has to reckon with language as well as cultural barriers when recruiting designers from other countries. On the other hand if furniture is designed for an international or global market, to recruit designers world wide will be a viable strategy to increase the changes of better serving the consumer wishes of other cultures and countries.

Training and retraining employed workers is also considered a viable option. However, this only applies to employees that have already a background in designing. Training these workers should mainly be focused on e-skills (designing furniture on the web) and on new materials, concepts and products. Changing vocational education is not necessary, although some more attention should be given to e-skills in the relevant vocational/ educational programs.

In both *customisation* scenarios contact with the customer will be of great importance since a customer could very well become a co-designer. Closer business-to-customer (B2C) interaction will require additional social and e-skills from the industrial designer. These aspects should be paid attention to in training courses as well as in vocational education programs.

Table 14.3 Strategic options industrial designers

Questions	Answers	
1. What is the maximum volume effect?	Increase	
2. What is the maximum change in skills?	8	
3. Do SMEs play a large role?	Yes	
4. Is the sector national/EU/global?	Global (except LC and LMP)	
5. Is the workforce old?	No	
6. Is the workforce low educated?	No	
Options	**Is this option viable?**	**Actors***
A. Recruiting workers from other sectors	Yes, design is "pluri-sectoral"	C
B. Recruiting workers from other Member States	Yes	C, S, E, I
C. Recruiting workers from non-Member States	Yes	C, S, E, I
D. Recruiting unemployed with or without re-training	No	
E. Recruiting young people from the education system	Yes	C, E
F. Training and re-training employed workers	No with exception of technical aspects of design	C, E
G. Changing work organisation	Yes	C, I
H. Outsourcing and off-shoring	Yes, outsourcing mainly SME	C
I. Changing vocational education	Yes, more sector-oriented	
J. Designing and offering new courses	Yes, more sector-oriented	
K. Providing information about emerging skills	Yes, to inform (new) employees about the required skills	C, S
L. Improve the image of the sector	Not necessary for designers	
M. Stronger cooperation between stakeholders	Yes,	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.7 Production managers

This function describes the activity of developing the most appropriate method and sequence of operations for a particular project. It is a rather organisational function that accompanies the whole furniture production process. For globalisation as well as for customisation scenarios this function will become more challenging in the future.

In almost every skill category, the demands will rise. Especially e-skills will become very relevant in every scenario since the activities are going to be increasingly 'e' and knowledge-based. Organisation and coordination will be key elements for efficient and successful activities.

Table 14.4 presents the viable strategic options for emerging competences of Production managers in the furniture sector. Many strategic options mentioned in the table are considered more-or-less viable. For this job function recruiting workers from other sectors is a limited option if these are similar sectors (e.g. textiles, other wood-based sectors). Recruitment from other states, especially Member States, is a viable option, mainly for larger companies and for companies with foreign ownership. Recruiting from non-Member States may be more difficult since cultural differences and language barriers are often more substantial. An intercultural workforce might open up new possibilities in terms of market access. In globalisation scenarios recruiting from other countries is therefore an even more viable option. Recruiting unemployed people is a viable option also, but only with some additional training, since the unemployed often lack the contemporary competences required to work as an engineer. Still it is more likely that the unemployed will be hired in another function and will grow into this function over time and experience.

Recruitment of young people through well developed technical traineeships (or courses) is also a viable option. A focus in these training courses should also be on e-skills, especially in the customisation scenarios. These latter training packages should also be made available for older workers to retrain them or for unemployed to introduce them to working in the furniture sector. The offering and designing of new courses as well as changes in the vocational education courses should focus on these aspects.

Table 14.4 Strategic options Production managers

Questions	Answers	
1. What is the maximum volume effect?	Increase (GMP and GC), maintain (LC)	
2. What is the maximum change in skills?	24	
3. Do SMEs play a large role?	Yes	
4. Is the sector national/EU/global?	Global (except LC)	
5. Is the workforce old?	Yes	
6. Is the workforce low educated?	Yes	
Option	**Is this option viable?**	**Actors***
A. Recruiting workers from other sectors	Yes, limited to similar sectors, like textiles and other woodbased sectors.	C, E
B. Recruiting workers from other Member States	Yes, less viable for SMEs and often language barrier	C, G
C. Recruiting workers from non-Member States	Yes, but difficult for SMEs and often language barrier.	C, G
D. Recruiting unemployed with or without re-training	Yes, specific (re)training required	C, U
E. Recruiting young people from the education system	Yes, apprenticeships. Training on the job.	C, E
F. Training and re-training employed workers	Yes, Training on the job.	C, E, I
G. Changing work organisation	Yes	C, U, S, E
H. Outsourcing and off-shoring	No	
I. Changing vocational education	Yes, e-skills	S, E, G
J. Designing and offering new courses	Yes, e-skills	C, S, E, G
K. Providing information about emerging skills	Yes, to inform (new) employees about the required skills	C, S, E, G
L. Improve the image of the sector	Yes, needed to recruit employees	C, S, E, U, G, I
M. Stronger cooperation between stakeholders	Yes, including stronger cooperation with all stakeholders	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.8 Accounting & finance professionals

This job category is in particular relevant for the large(r) companies in the furniture industry. Most SMEs, however, tend to outsource the accounting and finance function. As globalisation and customisation are expected to grow, communicative skills are generally getting more important, also for accounting & finance professionals. Also, in the global scenarios, complexity and time-zone issues will increase, necessitating more flexibility and analytical skills. Working in many different countries also requires knowledge on more different regional and local rules and regulations. The least challenging scenario for accounting would be local customisation, since language skills, requiring new knowledge on local and regional rules and regulations and flexibility will not be that important. The number of accounting staff will only slightly increase in the *global mass production* scenario, due to growing outsourcing and off-shoring tendencies of accounting and finance (A&F).

Table 14.5 presents strategic options for emerging skills and competences related to the accounting and finance professionals in the furniture sector. Some A&F emerging skills, such as legal and regulatory knowledge of an international, national or even regional nature, are considered generic skills that can easily be recruited from other sectors. The same goes for e-skills.

These generic e-skills can also be recruited from other countries (Member States as well as non-Member States). Also emerging accounting and finance skills can be recruited from other countries. This is mainly a viable option in the GMP scenario in which it is important to recruit A&F personnel with knowledge of local, regional or national laws and regulations in new markets. Recruiting accounting and finance skills from other states within or outside the EU can pose difficulties however, since regulatory and legislative knowledge are often country-specific. Recruiting these skills from other member states is a viable option only for operations from the home state of recruits. Recruiting skills for other countries or markets than the home market of the recruit would be a less viable option.

Recruiting young people as well as recruiting the unemployed is not really a viable option, since a lot of specific training would be required, either in country-specific skills and knowledge or in sector-specific skills and knowledge.

Although the need for accounting and finance professionals is expected to be modest in the furniture sub-sector, replacing employees that leave the labour market will be necessary and recruiting these skills from other sectors is a viable option.

To make recruitment activities in other states more viable training programs can be developed that provide recruits with an international set of skills and knowledge of international laws and rules. The EU could help in standardizing international rules and laws, potentially improving labour mobility. For furniture an extra effort should be on training personnel in acquiring e-skills needed to function well in GC or LC scenarios.

Table 14.5 Strategic options accounting & finance professionals

Questions	**Answers**	
1. What is the maximum volume effect?	Limited increase (GMP), maintain (LC and GC)	
2. What is the maximum change in skills?	10	
3. Do SMEs play a large role?	Yes	
4. Is the sector national/EU/global?	Global (except LC)	
5. Is the workforce old?	No	
6. Is the workforce low educated?	No	
Options	**Is this option viable?**	**Actors***
A. Recruiting workers from other sectors	Yes, mainly generic skills involved (business, finance, law)	C
B. Recruiting workers from other Member States	Yes, in GMP	C, S, E, I
C. Recruiting workers from non-Member States	Yes, in GMP	C
D. Recruiting unemployed with or without re-training	No	
E. Recruiting young people from the education system	No	
F. Training and re-training employed workers	Yes, GMP and GC training in regulations in 'new' markets	C, E
G. Changing work organisation	No	
H. Outsourcing and off-shoring	Yes	C
I. Changing vocational education	No	
J. Designing and offering new courses	Yes, aiming at: (a) improving e-skills in using new programmes; and (b) improving knowledge about international law in case of the GMP and GC scenarios	C, S, E
K. Providing information about emerging skills	Not necessary	
L. Improve the image of the sector	Yes, needed to recruit employees	C, S, E, U, G, I
M. Stronger cooperation between stakeholders	Yes, including stronger cooperation with all stakeholders	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.9 Sales & marketing professionals

Sales and marketing activities will become more important for the furniture industry in all three scenarios. Especially in the global scenarios, social and language skills will become more important. In general, creativity and taking initiative will be of relevance due to a general up-scaling of marketing innovations by all competitors. Internet-based sales, advertising and marketing will become standard, providing more opportunities for original concepts and strategies. Especially the Internet as a commercial platform necessitates creative marketing concepts due to huge competition. Technical knowledge may also become more important for marketing because of the development of new materials, new concepts and innovations whose advantages have to be explained to the customers.

Table 14.6 presents strategic options for emerging skills and competences related to sales and marketing professionals in the furniture sector. Recruitment of workers from other sectors is a viable strategic option for the furniture sector, although product and material knowledge will become more and more important in this job function and furniture has problems with image to attract marketing and sales people from other sectors. New recruits from other sectors will therefore often need to be trained on the job in order to gain a more profound understanding of consumer and supplier needs, materials used and products made. Also e-commerce will become a main issue.

In formulating a recruitment strategy aimed at pulling in workers from other countries (inside or outside the EU), as well as for pulling in young people and unemployed people, firms should broaden their recruitment horizon and also aim at for instance female workers. The furniture sector is still very much a 'white males' sector. A characterization that does not appeal to the female workforce that offers sales and marketing potential. In addition to broadening the recruitment horizon, however, improving education and training opportunities and content is also in order. New courses need to be developed and vocational education needs to be updated. The main focus should be on technical product specifications and translating these for clients in different markets and countries as well as on using the Internet and websites in customizing products and on helping customers to choose materials and products via electronic portals. The latter is mainly in order in the GC and LC scenarios. Also some basic knowledge on regional rules and regulations on materials use and product specifications is in order.

Recruiting young people is a further viable option especially related to up-to-date e-skills. Young people are used to work with ICT and will be able to learn these skills more quickly than older workers. Also, young people often possess more intercultural and language skills as they grew up in a more mixed society/ school environment.

Since the future appears to be e-driven within the furniture industry, changing the work organisation is also a viable strategic option. The industry could for example increase tele-working possibilities in order to appeal to specific groups of workers. Outsourcing and off-shoring are also viable options, especially in combination with the development of e-portals for business-to-customer (B2C) and business-to-business (B2B) communication. Also market research can be outsourced to specialized companies. The latter is mainly a viable option in the sense that market research in emerging markets may very well be performed by local agencies.

Table 14.6 Strategic options sales & marketing professionals

Questions	Answers	
1. What is the maximum volume effect?	Increase (GMP, LC and GC)	
2. What is the maximum change in skills?	17	
3. Do SMEs play a large role?	Yes	
4. Is the sector national/EU/global?	Global (except LC)	
5. Is the workforce old?	No	
6. Is the workforce low educated?	No	
Options	**Is this option viable?**	**Actors***
A. Recruiting workers from other sectors	Yes, but limited	C
B. Recruiting workers from other Member States	Yes	C, G
C. Recruiting workers from non-Member States	Yes	C, G
D. Recruiting unemployed with or without re-training	Yes, but with retraining in product and materials knowledge and ICT skills	C, G, I
E. Recruiting young people from the education system	Yes	C, E, U, S
F. Training and re-training employed workers	Yes, e-skills need updating (electronic sales portals) as well as knowledge on new materials, concepts and innovations.	C, E, S, U
G. Changing work organisation	Yes	C, I
H. Outsourcing and off-shoring	Yes, outsourcing market research/ B2B and B2C via electronic portals	C
I. Changing vocational education	Yes, marketing and sales via electronic portals B2C and B2B, working and communicating in full product life cycle	S, E
J. Designing and offering new courses	Yes, mainly sector specific modules in product knowledge (technical understanding), e-skills and laws and regulations in emerging markets (in GC and GMP)	C, E, S
K. Providing information about emerging skills	Yes	C, S, I
L. Improve the image of the sector	Yes, needed to recruit employees	C, S, E, U, G, I
M. Stronger cooperation between stakeholders	Yes, including stronger cooperation with all stakeholders	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.10 Supply chain managers

Especially in global settings the function of supply chain managers will generally get more important. Here the manufacturing of furniture is not a local, but a global process where materials and production are organised internationally, depending on the optimisation of prices and material availability. The understanding of customers and suppliers is of much relevance and especially global scenarios require a high degree of flexibility. Knowledge about legal issues and regulations will generally become more important due to new and stricter rules, e.g. in regard to environmental and safety aspects. The same applies for a certain degree of technical knowledge when it comes to innovations and the use of new materials and product components.

Table 14.7 presents the strategic options for emerging skills and competences related to supply chain managers. Recruiting workers from other sectors and countries are all viable options, as is the recruitment of unemployed people and young people form the education system. Some introductory training will be necessary for people who do not have a basic technical understanding, however. This goes especially for the long term unemployed. Mainly social, technical and E-skills are of growing importance and since these or not really sector or country specific, they can be recruited anywhere.

Since the job function of supply chain managers is a relatively new one training and retraining of employees is also a viable option, as is changing vocational education and designing new courses. Vocational education as well as training should then be aimed at communication skills, E-skills and some basic technical skills that mainly concerns knowledge of (new) materials and products. Also some basic knowledge of rules and regulations, either general of country specific is in order, depending on the market to be served.

Supply chain managers need to be in good contact with marketing and sales in order to be able to buy the right materials. This makes changing the work organisation in a way that this continuous contact is possible a viable as well as a necessary step.

Table 14.7 Strategic options supply chain managers

Questions	**Answers**	
1. What is the maximum volume effect?	Increase GMP and GC, limited increase LC	
2. What is the maximum change in skills?	15	
3. Do SMEs play a large role?	Yes	
4. Is the sector national/EU/global?	Global	
5. Is the workforce old?	Yes, experience and trust count in this function	
6. Is the workforce low educated?	Mixed, somtetimes educated, somtimes just skilled	
Options	**Is this option viable?**	**Actors***
A. Recruiting workers from other sectors	Yes, aim at technical sectors, since a basic technical understanding is useful.	C
B. Recruiting workers from other Member States	Yes, but only limited an option	C, S, E, I
C. Recruiting workers from non-Member States	Yes, see above	C, S, E, I
D. Recruiting unemployed with or without re-training	No	
E. Recruiting young people from the education system	Yes, e-skills, language and intercultural skills readily available	C, I, E
F. Training and re-training employed workers	Yes, train communication skills, as well as e-skills and knowledge of laws and regulations. Knowledge of new products and materials.	C, E
G. Changing work organisation	No	
H. Outsourcing and off-shoring	No	C
I. Changing vocational education	Yes, include supply chain management in the curriculum of vocational education	S, E
J. Designing and offering new courses	Supply chain management	S, E
K. Providing information about emerging skills	Yes	S, I
L. Improve the image of the sector	Yes, needed to recruit employees	C, S, E, U, G, I
M. Stronger cooperation between stakeholders	Yes, including stronger cooperation with all stakeholders	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.11 Administrative support staff

Much of the administrative work may become outsourced or will be automated (e.g., with better software). Especially in global scenarios, language and communication skills as well as flexibility will become more important. Due to expected increases in regulations, improved legal knowledge will add as an upcoming skill for administrative support staff.

As a result of these developments recruiting activities can be limited to young people from the education system, as Table 14.8 shows. These new employees should be used to replace employees that leave the furniture sector and to ensure the import of new administrative concepts and methods into the organizations.

Since in GC and LC the furniture production process will become different, the administrative support staff job function can be expected to change as well. These changes require training and retraining of employed workers, as well as changing vocational education and developing new courses and training. These new educational programs should aim mainly on providing administrative support staff with up-to-date e-skills, planning skills and some basic knowledge on local or regional administrative rules and regulations

Table 14.8 Strategic options administrative support staff

Questions	Answers	
1. What is the maximum volume effect? 2. What is the maximum change in skills? 3. Do SMEs play a large role? 4. Is the sector national/EU/global? 5. Is the workforce old? 6. Is the workforce low educated?	Maintain 9 Yes Global (except LC) Yes Mainly	
Options	**Is this option viable?**	**Actors***
A. Recruiting workers from other sectors	Not necessary	
B. Recruiting workers from other Member States	Not necessary	
C. Recruiting workers from non-Member States	Not necessary	
D. Recruiting unemployed with or without re-training	Not necessary	
E. Recruiting young people from the education system	Yes, in order to maintain	C, E
F. Training and re-training employed workers	Yes, mainly e-skills, planning, laws and regulatory knowledge	C, E
G. Changing work organisation	Yes, introducing teleworking and teamwork	C
H. Outsourcing and off-shoring	Yes, outsourcing and off-shoring	C
I. Changing vocational education	Yes, e-skills, GC and GMP communication and networking; laws and regulatory knowledge	S, E
J. Designing and offering new courses	Yes, e-skills, GC and GMP communication and networking; laws and regulatory knowledge	S, E
K. Providing information about emerging skills	Not necessary	
L. Improve the image of the sector	Yes, needed to recruit employees	C, S, E, U, G, I
M. Stronger cooperation between stakeholders	Yes, including stronger cooperation with all stakeholders	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.12 Plant and machinery maintenance and repair workers

Much of these tasks will be performed by the builder of the machinery. Since new machines/technology will be more software-based, e-skills are getting very important for maintenance and repair workers. In general, machinery will become more multifunctional and complex, necessitating higher technical and analytical skills in general.

Table 14.9 presents strategic options for emerging competences related to plant and machinery repair and maintenance. Recruiting workers from other sectors as well as recruiting workers form other states, member as well as non-member, are considered viable options. Recruiting workers form other sectors is, however, limited to workers with generic skills. Specific skills needed to maintain or repair 'furniture-specific' machinery can only be recruited from the furniture sector in other states, not from other sectors.

Next to recruiting across national borders or sectoral borders, recruiting youngsters from the education system as well as recruiting the unemployed are viable options. In the case of the unemployed, however, some training is probably required, mainly in technical knowledge and E-skills. Also the provision of knowledge on new materials or products may be in order. Youngsters should mainly be recruited to replace employees that leave the labour market.

Training employed workers is also a viable option. In order to provide this training the development of new training programs or the alteration of existing programs may be in order. These new or altered training programs should put an emphasis on technical knowledge was well as e-skills (ICT as well as programming). The sector could work together with educational institutions and sector organisations to develop a basic technical training for machinery maintenance and repair staff.

Table 14.9 Strategic options plant and machinery maintenance and repair workers

Questions	**Answers**	
1. What is the maximum volume effect?	Maintain in GMP, slight increase LC and GC	
2. What is the maximum change in skills?	10	
3. Do SMEs play a large role?	Yes	
4. Is the sector national/EU/global?	Global (except LC)	
5. Is the workforce old?	Yes	
6. Is the workforce low educated?	Yes mainly	
Options	**Is this option viable?**	**Actors***
A. Recruiting workers from other sectors	Yes, generic skills needed	C
B. Recruiting workers from other Member States	Yes	C, S, I
C. Recruiting workers from non-Member States	Yes	C, S, I
D. Recruiting unemployed with or without re-training	Yes, some training necessary in technical knowledge and e-skills	C, E
E. Recruiting young people from the education system	Yes	C, E
F. Training and re-training employed workers	Yes, mainly technical knowledge and e-skills (ICT and programming)	C, E
G. Changing work organisation	No	C, I
H. Outsourcing and off-shoring	Yes, both outsourcing (mainly in GMP) and off-shoring (GC)	C
I. Changing vocational education	Yes, related to technical knowledge and e-skills	E, S
J. Designing and offering new courses	Yes, related to technical knowledge and e-skills	E, S
K. Providing information about emerging skills	Yes	C, S, I
L. Improve the image of the sector	Yes, needed to recruit employees	C, S, E, U, G, I
M. Stronger cooperation between stakeholders	Yes, including stronger cooperation with all stakeholders	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.13 Skilled handicraft workers

Table 14.10 shows the strategic options that are viable for the furniture sector in providing oneself with the skills needed for skilled handicraft workers in the longer term. Since in none of the four scenarios an increase in the number of skilled handicraft workers is expected, no recruiting is necessary, other than the recruitment of young people from the education system and a fair number of people from other Member States to replace workers that leave the labour market.

Skilled handicraft workers will be more important in the customisation scenarios, although an increase in automation is also expected in this area until 2020. The necessity of e-skills and technical skills is expected to grow, as well as knowledge about new materials. In the customisation scenarios it will be important to figure ways how to translate the customer wishes into the desired product, which necessitates flexibility and creativity from a more analytical perspective. The borders between handicraft workers and machine operators may blur, requiring multi-skilling.

Since the kind of work that skilled handicraft workers do will change, some training and retraining will be in order. First of all the job function of the skilled handicraft workers and the skilled non-handicraft worker will eventually become one and the same, requiring multi-skilling for both job functions. Next to that, mainly E-skills, knowledge of new materials and social skills are in order. Making these aspects central aspects in training courses as well as in vocational education is a viable as well as necessary option. Multi-skilling and closer teamwork between skilled and low-skilled handicraft workers implies changing the work organisation, for instance job enlargement as well as multi-skilling are in order. Some additional training may be required. One of the challenges might be to maintain the current skilled-handicraft workers who might be attracted to leave to other sectors for more interesting work of higher salaries.

Table 14.10 Strategic options skilled handicraft workers

Questions	Answers	
1. What is the maximum volume effect? 2. What is the maximum change in skills? 3. Do SMEs play a large role? 4. Is the sector national/EU/global? 5. Is the workforce old? 6. Is the workforce low educated?	Maintain in GC and LC, decrease in GMP 16 Yes Global (except LC) Middle aged Yes, mainly	
Options	**Is this option viable?**	**Actors***
A. Recruiting workers from other sectors	Not necessary	
B. Recruiting workers from other Member States	Yes, for replacement	C, G, S
C. Recruiting workers from non-Member States	Possible, but marginal	C
D. Recruiting unemployed with or without re-training	Not necessary	
E. Recruiting young people from the education system	Yes, but only replacement demand	C, S, E
F. Training and re-training employed workers	Yes, multi-skilling, mainly e-skills and social skills	C, S, E, U
G. Changing work organisation	Yes, combination with machine operators jobs. Job enlargement (multi-skilling)	C, I, G
H. Outsourcing and off-shoring	Yes, both outsourcing (mainly in GMP) and off-shoring (GC)	C
I. Changing vocational education	Yes, renew technical knowledge (new materials), e-skills, multi-skilling	C, S, E
J. Designing and offering new courses	Yes, on new materials, e-skills and social skills	C, S, E
K. Providing information about emerging skills	Yes	C, S, I
L. Improve the image of the sector	Yes, needed to recruit employees	C, S, E, U, G, I
M. Stronger cooperation between stakeholders	Yes, including stronger cooperation with all stakeholders	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.14 Machine operators and skilled non-handicraft workers

Automation will increasingly enter the furniture industry. This applies especially to large companies, but until 2020 also to a growing number of SMEs. Machines are getting more sophisticated, IT-based and complex, necessitating more information-based than manual skills. E-skills and technical knowledge grow in importance. It is also likely that fewer people will control a growing number of machines and that programming skills will become central. Not only technical and e-skills will become more important, but also social skills, especially in the global scenarios.

Table 14.11 presents the related strategic options. Recruiting technical knowledge from other sectors is possible, but only viable for generic skills. Similarly, recruiting people from other countries is a viable option. The EU could facilitate intersectoral and international labour mobility. However, this requires standardising of safety standards together with the furniture industry. Recruiting young people from the education system is also a viable option that deserves full attention. Recruiting unemployed is also considered a viable option, although some training or retraining in technical as well as e-skills will always be in order.

With technical as well as e-knowledge of key importance on the job, training courses are needed to keep technical skills up-to-date. These aspects should also stand at the core of possible alterations in the vocational education program, however.

Since we expect skilled non-handicraft workers/ machine operators and skilled handicraft workers to start working together ever closer, some organisational changes may also be in order. These two job functions may eventually very well become one job function, with the implication that every worker should be able to both handle new machinery as well as handicraft furniture him- or herself. Multi-skilling these groups of workers as well as organising working together are in order.

Table14.11 Strategic options machine operators and skilled non-handicraft workers

Questions	**Answers**	
1. What is the maximum volume effect? 2. What is the maximum change in skills? 3. Do SMEs play a large role? 4. Is the sector national/EU/global? 5. Is the workforce old? 6. Is the workforce low educated?	Maintain in GMP, slight increase LC and GC 13 Yes Global (except LC and LMP) Yes, but not in all MS Medium	
Options	**Is this option viable?**	**Actors[1]**
A. Recruiting workers from other sectors	Yes, generic skills needed	C
B. Recruiting workers from other Member States	Yes	C, S, I, U
C. Recruiting workers from non-Member States	Yes	C, S, I
D. Recruiting unemployed with or without re-training	Yes, some training necessary in technical knowledge and e-skills	C, E
E. Recruiting young people from the education system	Yes	C, E
F. Training and re-training employed workers	Yes, mainly technical knowledge and e-skills (ICT and programming)	C, E, U
G. Changing work organisation	Yes, combination with skilled handicraft workers' jobs. Job enlargement (multi-skilling)	C, I
H. Outsourcing and off-shoring	Yes, both outsourcing (mainly in GMP) and off-shoring (GC)	C
I. Changing vocational education	Yes, related to technical knowledge and e-skills	E, S, U, G
J. Designing and offering new courses	Yes, related to technical knowledge and e-skills	E, S, U, G
K. Providing information about emerging skills	Yes	C, S, I
L. Improve the image of the sector	Yes, needed to recruit employees	C, S, E, U, G, I
M. Stronger cooperation between stakeholders	Yes, including stronger cooperation with all stakeholders	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.15 Labourers

This category will be most threatened by automation processes. A general up-skilling is needed. Increasing technical and language skills will become more important. Also social skills will grow in relevance.

Table 14.12 presents the strategic options for emerging competences related to low skilled labourers. We expect a strong decline in the number of jobs within this job category. That is why only a few emerging competences were assessed. Current labourers need to be up-skilled/(re)trained with mainly technical and social qualifications to the level of plant and machinery maintenance and repair workers or even planning engineers. Labourers outside production are likely to be replaced by technology (security/-receptionists) or outsourced to the service sector (cleaning / maintenance).

Table 14.12 Strategic options labourers

Questions	Answers	
1. What is the maximum volume effect?	Decreasing	
2. What is the maximum change in skills?		
3. Do SMEs play a large role?	Yes	
4. Is the sector national/EU/global?	Global (except LC)	
5. Is the workforce old?	Yes	
6. Is the workforce low educated?	Yes	
Options	**Is this option viable?**	**Actors***
A. Recruiting workers from other sectors	Not necessary	
B. Recruiting workers from other Member States	Not necessary	
C. Recruiting workers from non-Member States	Not necessary	
D. Recruiting unemployed with or without re-training	Not necessary	
E. Recruiting young people from the education system	Not necessary	
F. Training and re-training employed workers	Yes, up-skilling in technical qualifications and social skills (language)	C, S, E
G. Changing work organisation	No, automation of production processes	C
H. Outsourcing and off-shoring	No	
I. Changing vocational education	No	
J. Designing and offering new courses	Yes, general up-skilling in e-skills, technical knowledge and social skills	C, S, E
K. Providing information about emerging skills	Not necessary	
L. Improve the image of the sector	Yes, needed to recruit employees	C, S, E, U, G, I
M. Stronger cooperation between stakeholders	Yes, including stronger cooperation with all stakeholders	C, S, E, U, G, I

* C = company; S = sector organisations and chambers of commerce; E =education & training; G =governments; I = intermediary organisation, public or private.

14.16 Scenario implications, future skills and knowledge needs and possible solutions: summary and main conclusions

Implications of the scenarios in terms of expected volume changes in employment (jobs), future skills and knowledge needs as well as ways to address and solve these needs (strategic choices) have all been analysed so far at the individual job function level. This section serves to summarise in Table 14.13 the main implications and solutions for each of the job functions presented in chapters 12, 13 and 14. It serves as a bridge to the next chapter where we shift from a micro perspective (job functions) to a meso (sector and policy) perspective.

Summary of job volumes, skills changes, strategic choices and main players for anticipatory action by scenario					
		Mass Production		***Customisation***	
		Local	**Global**	**Local**	**Global**
Managers	1. Employment volume change	M	M/I	I	I
	2. Skills changes counted	1	16	7	10
	3. Emerging skills needs		Social, Entrepreuneurship	Entrepreuneurship	Social, Entrepreuneurship
	4. Most important solutions	changing work organisation , new courses	changing work organisation , new courses, outsourcing and off-shoring	changing work organisation , new courses	changing work organisation , new courses, outsourcing and off-shoring
	5. Most important actors	C, S, E	C, S, E	C, S, E	C, S, E
ICT professionals	1. Employment volume change	M	M/I	I	I
	2. Skills changes counted	5	10	11	14
	3. Emerging skills needs	Social	Social, Problem solving, Management, Knowledge	Social, Problem solving, Knowledge, Entrepreneurship	Social, Problem solving, Entrepreneurship, Knowledge
	4. Most important solutions	Recruiting workers from other sectors	Recruiting workers from other sectors and (non)-Member States	Recruiting workers from other sectors	Recruiting workers from other sectors and (non)-Member States
	5. Most important actors	C, S, I	C, S, E, G, I	C, S, I	C, S, E, G, I
Industrial designers	1. Employment volume change	M	M/I	I	I
	2. Skills changes counted	6	6	5	8
	3. Emerging skills needs	**Knowledge**	**Knowledge**	**Knowledge**	**Knowledge**, Entrepreneurship
	4. Most important solutions	Recruiting workers from other sectors and (non)-Member States, outsourcing	Recruiting workers from other sectors and (non)-Member States, outsourcing	Recruiting workers from other sectors and (non)-Member States, outsourcing	Recruiting workers from other sectors and (non)-Member States, outsourcing
	5. Most important actors	C, S, E, I	C, S, E, I	C, S, E, I	C, S, E, I
Production managers	1. Employment volume change	M	I	M	I
	2. Skills changes counted	10	23	20	24
	3. Emerging skills needs	Self management, Management, **Knowledge**	Social, Problem solving, Self management, Management, **Knowledge**	Social, Problem solving, Self management, Management, **Knowledge**	Social, Problem solving, Self management, Management, **Knowledge**
	4. Most important solutions	Recruiting workers from (non)-Member States	Recruiting workers from (non)-Member States	Recruiting workers from (non)-Member States	Recruiting workers from (non)-Member States
	5. Most important actors	C, G	C, G	C, G	C, G

		Mass Production		*Customisation*	
		Local	**Global**	**Local**	**Global**
Accounting & Finance	1. Employment volume change	M	M/I	M	M
	2. Skills changes counted	5	10	6	10
	3. Emerging skills needs	Knowledge	Social, Knowledge	Knowledge	Social, Knowledge
	4. Most important solutions	Improve image, recruiting workers from other sectors	Improve image, recruiting workers from other sectors and (non)-Member States, recruiting workers from other sectors	Improve image, recruiting workers from other sectors	Improve image, recruiting workers from other sectors
	5. Most important actors	C, S, E, I	C, S, E, I	C, S, E, I	C, S, E, I
Sales & marketing	1. Employment volume change	M/I	I	I	I
	2. Skills changes counted	7	17	10	15
	3. Emerging skills needs	Entrepreneurship, Knowledge	Social, Self management, Entrepreneurship, Knowledge	Entrepreneurship, Knowledge	Social, Self management, Entrepreneurship, Knowledge
	4. Most important solutions	training and re-training employed workers, Outsourcing and off-shoring, Improve image	training and re-training employed workers, Outsourcing and off-shoring, Improve image	training and re-training employed workers, Outsourcing and off-shoring, Improve image	training and re-training employed workers, Outsourcing and off-shoring, Improve image
	5. Most important actors	C, S, E, U, G, I	C, S, E, U, G, I	C, S, E, U, G, I	C, S, E, U, G, I
Supply chain managers	1. Employment volume change	I	I	M/I	I
	2. Skills changes counted	11	14	11	15
	3. Emerging skills needs	Social, Knowledge	Social, Knowledge	Social, Knowledge	Social, Knowledge
	4. Most important solutions	Recruiting young people from the education system, Training and re-training employed workers	Recruiting young people from the education system, Training and re-training employed workers	Recruiting young people from the education system, Training and re-training employed workers	Recruiting young people from the education system, Training and re-training employed workers
	5. Most important actors	C, I, E	C, I, E	C, I, E	C, I, E
Administrative support staff	1. Employment volume change	M	M	M	M
	2. Skills changes counted	4	9	4	9
	3. Emerging skills needs	Social	Social, Self management	Social	Social, Self management
	4. Most important solutions	Recruiting young people from the education system	Recruiting young people from the education system	Recruiting young people from the education system	Recruiting young people from the education system
	5. Most important actors	C, E	C, E	C, E	C, E

		Mass Production		*Customisation*	
		Local	**Global**	**Local**	**Global**
Plant and machinery maintenance and repair staff	1. Employment volume change	M/I	I	M/I	I
	2. Skills changes counted	7	10	7	16
	3. Emerging skills needs	Self Management, Knowledge	Social, Self Management, Knowledge	Self Management, Knowledge	Social, Self Management, Knowledge
	4. Most important solutions	Training and re-training employed workers	Training and re-training employed workers , outsourcing	Training and re-training employed workers	Training and re-training employed workers , off-shoring
	5. Most important actors	C, E	C, E	C, E	C, E
Skilled handicraft workers	1. Employment volume change	D	D	M/D	M/D
	2. Skills changes counted	10	14	14	16
	3. Emerging skills needs	Social, Problem solving, Management, Knowledge	Social, Problem solving, Management, Knowledge	Social, Problem solving, Management, **Knowledge**	Social, Problem solving, Management, **Knowledge**
	4. Most important solutions	Training and re-training employed workers	Training and re-training employed workers, outsourcing	Training and re-training employed workers	Training and re-training employed workers, offshoring
	5. Most important actors	C, S, E, U	C, S, E, U	C, S, E, U	C, S, E, U
Machine operators	1. Employment volume change	M	M	M/I	M/I
	2. Skills changes counted	9	11	11	13
	3. Emerging skills needs	**Problem solving**, Self management, Management, **Knowledge**	Social, **Problem solving**, Self management, Management, **Knowledge**	Social, **Problem solving**, Self management, Management, **Knowledge**	Social, **Problem solving**, Self management, Management, **Knowledge**
	4. Most important solutions	Recruiting young people from the education, recruiting workers from other sectors and (non)-Member States	Recruiting young people from the education, recruiting workers from other sectors and (non)-Member States, outsourcing	Recruiting young people from the education, recruiting workers from other sectors and (non)-Member States	Recruiting young people from the education, recruiting workers from other sectors and (non)-Member States, offshoring
	5. Most important actors	C, E, U	C, E, U	C, E, U	C, E, U
Labourers	1. Employment volume change	D	D	D	D
	2. Skills changes counted	2	5	6	8
	3. Emerging skills needs		Social	Self management, Knowledge	Social, Self management, Knowledge
	4. Most important solutions	Training and re-training employed workers	Training and re-training employed workers	Training and re-training employed workers	Training and re-training employed workers
	5. Most important actors	C, S, E	C, S, E	C, S, E	C, S, E

15 Conclusions and recommendations for education and training

15.1 Introduction

This chapter presents the main conclusions and recommendations for education and training; chapter 16 presents the main other conclusions and recommendations. Whereas the earlier chapters very much take a micro perspective by focusing on job functions in terms of expected volume changes, skills and knowledge needs and ways to address and solve these needs (strategic choices), chapter 15 takes a *meso* or *sector* perspective. It addresses a number of issues, part of which coming already to the fore in earlier chapters, and part being 'new' issues although much related to those already raised. The conclusions and recommendations are mostly based on the results of the preceding chapters; they were discussed during the final workshop with social partners, the industry and other experts.

The recommendations contained in this chapter should not be seen as fully exhaustive. They rather form the basis for further discussion and elaboration at various decision-making levels, ranging from the European Union and the Member State to the regional and local level. Industry itself – firms – have an important role to play, as do education and training institutes, social partners and the government (EU, national, regional and local). In most cases action should be taken jointly, by involving various actors, sometimes even at different levels. Collaboration and co-operation as buzzwords in today's economy are easily coined. Making collaboration work in practice is, however, a challenge which requires mutual understanding, compromise and perseverance.

15.2 Conclusions and recommendations for education and training

This section specifically discusses the implications for education and training. The results reported here are based on the conclusions of an internal workshop and expert judgment. They also include examples of initiatives from some of the larger EU Member States, in particular the UK, Germany, Italy and Spain, based on a literature review.

A general finding of the study is that challenges for education and training in the sector cannot be solved by education and training institutions on their own. A number of stakeholders needs to actively work together in order to provide joint answers to the problem of the sector. More specifically the following recommendations can be made.

1) Adapt and modernise vocational education and training (VET) and general education systems

Both vocational education and training (VET) systems and the general education systems (primary, secondary and tertiary education) differ considerably between Member States, in terms general set-up, organisation and implementation (see Box 6). While a discussion about which are the most adequate models and/or best practices is useful, the current variety in VET and general education systems in Europe makes it very difficult to come up with specific conclusions or recommendations about education needs and requirements for the chemicals sector from an EU-wide perspective. Most conclusions and recommendations should be based on the particularities of the existing education systems in the Member States, or even regions. This obviously is beyond the scope of this study. Some general observations can, however, be made. As a general trend most Member States at all levels of education tend to focus more than in the past on 'teaching' soft skills, by integrating soft-skills related

lessons in existing curricula. One also observes a counterdevelopment in that in some Member States there is again a call for conventional knowledge and the teaching of 'harder' skills, as the attention for soft skills would go at their expense. This holds both for secondary education (relating to essential knowledge of foreign languages, mathematics, physics and chemistry) as well as university education (too broad curricula).

Box 6. Vocational education and training– rich variety between Member States

A number of different systems in Vocational Education and Training (VET) as well as Initial and Continuing Vocational Education and Training (IVET and CVET) can be observed throughout the European Union. Various characteristics of these systems have to be taken into consideration when discussing possible specific implications for education and training. Existing VET-systems can be grouped into three main categories ('idealtypes'), (i) liberal, (ii) state-controlled and (iii) corporatist VET-systems, each having a different underlying rationale and distinguishing characteristics. Key in this distinction are those who decide about the structure and content of VET: business itself, the state or the state together with social partners (see Table below). The three VET-systems of Germany, France and the United Kingdom are of special importance as they can be taken as representative for each of the three 'idealtype' categorisations. They are evidence of the rich variations in existing VET systems and their implementation in Europe. The enterprise-based training system of Germany (the 'Dual System') is implemented by the social partners and the state. Next to this prevailing system other forms of VET exist. In France, a school-based training system is established and implemented by the state. Even though the full-time school-based training system competes to some extent with an upcoming apprenticeship training system, it is still the dominant form of vocational training in France. The system implemented in the UK, the national vocational qualification, is regulated and driven by market forces in several important segments. Although national vocational qualifications (NVQ) and general national vocational qualifications (GNVQ) are regulated at national level, the implementation of training is not yet regulated at national level. Commercial certification systems are still competing with national ones. Work-based, as well as full-time school-based training can be found. Special training schemes for unemployed, such as school-based schemes for unemployed youths or work social enterprises for long-term unemployed, are present in several European Member States. Besides these 'idealtypes' several mixed forms in Europe exist. In Spain, for example, one finds more informal forms of VET and in Central and East European countries the trend can be detected, that VET moves from a state centred model to a stronger corporatist model, while also business driven approaches exist in some sectors.

The different VET systems in Europe all have their own merits. It would make no sense to try to standardise VET throughout Europe. Especially in the new Member States, more focus and assistance is required to further fine-tune the existing VET systems to new and emerging needs (see further below).

Social mobility in many European countries is low. The VET system plays a key role for people to move up the social ladder. It is especially important to exploit the potential of 'late developers' that in the first instance did not reach tertiary education. VET systems should be enhanced to facilitate the option for people to continuously up-skill – also in light of life-long learning (LLL).

Table to Box 6. Three 'ideal-type' VET-models (elaborated from Clematide, 2005)			
	A. Liberal	**B. State-controlled**	**C. Corporatist**
Decision maker	Business (and individuals)	State	State and social partner organisations
Rationale	Liberalistic competitive	Centralistic state-centred	Corporative – social consensus
Programmes	Business and individual	Education and citizen	Occupation
Content	Needs of business and individual, utility oriented, short term and specific	Politically determined, general knowledge, course-oriented, academic	Determined by social partners, occupation centred, traditions
Labour markets VET relates to	Internal (business) labour markets	Occupational and internal labour markets	Occupational labour markets
Strengths	Flexible, cheap for the state, close to the needs of production	Strong linkage to the education system, no lack of training places	Broad vocational educations with status equal to general education
Weaknesses	Under-investment in training and education	Weak linkage to the labour market	Inertia in the institutions
Representatives	United Kingdom, Ireland	France	Germany, Austria, Denmark
Trends	Stronger state involvement in certification and quality	"Dual system" emerging and stronger orientation on business needs	Internal labour markets Marketing of VET

2) Introduce sector-specific skills at an early stage in vocational training

Ongoing technological change and fierce competition in the sector make it necessary to early combine theoretical, academic and vocational knowledge at all educational levels and in all forms. The transferability and connectivity of the different education and training systems should be enabled.

To improve the matching of skills taught at schools and skills needed by the industry, the British Department for Children, Schools and Families (DCSF) has created a new education pathway for children from 14 to 19 years.[18] The so-called `Diploma´ was jointly founded by education officials and the industry and tries to bridge general academic and vocational education.

3) Strengthen cooperation in sector-specific training measures

In order to keep pace with technological and subsequent organisational developments flexible and up-to-date training offers are required in the sector. The demand for building up cooperation between companies, social partners, training providers and research institutions is obvious. Interactions between the actors involved should take place on a regular basis and should be implemented in a dynamic way. Such cooperation would help to implement the

[18] http://www.dcsf.gov.uk/14-19/index.cfm?go=site.home&sid=47 and http://yp.direct.gov.uk/diplomas/ (both downloaded in October 2008).

concept of the "knowledge triangle", that is to say, to connect education with research and the innovation processes. Thus, training should aim to make workers acquainted with emerging processes in sector-specific innovations, research processes, and new educational settings (such as micro-learning, the use of social software and other networking practices). Since the trainings should especially meet the specific demands of SMEs, the participation of SMEs in the design process of the trainings should be promoted and encouraged. Chambers of Commerce, sectoral funds and training providers are expected to play a major role in organising joint efforts.

4) Enhance flexibility and modularisation in education

Several implications arise due to the strengths and weaknesses of the different VET systems in place, with sector specific challenges on the one hand and the employer needs on the other. Firstly, enhanced flexibility in education and training of technical occupations is needed. Flexibility in this sense refers to the capability of the VET system to adapt effectively to new training needs in terms of quality and quantity. A flexible VET system is required in particular in circumstances in which profound changes take place and job functions and occupational profiles alter quickly. In order to achieve more flexibility and to respond in-time with altering training contents and enhanced quantity a modularisation of education and training is recommended. Even if problems occur in the modularisation of training in some IVET systems, modular systems facilitate the building up of competences and ease the interaction between IVET and CVET systems. Flexibility is also required for different forms of education and training. Enhanced flexibility and a modularisation of IVET is a big challenge for the state-controlled and the corporatist systems. Liberal systems will find their ways easier. However, the liberal market-driven systems with their strong focus on technical on-the-job skills lag behind in general education, which in turn becomes an obstacle to the up-skilling of the individual and a higher permeability of the education system. Besides, general and generic skills are not obsolete but become more important as a basis for the ability to react on new training demands emerging from new technologies and changing production processes.

More important and sometimes presenting a deadlock is the consequence for Life Long Learning of the individual following from different VET systems. The corporatist and school based VET system guarantees a more universal initial vocational training and in the case of combined apprenticeships also a practical training on the job (dual system). However, continuing training is disregarded. The qualification level once acquired leads to reposing on the achieved and Life Long learning is not given a key focus. VET structures are not capable of adapting quickly to the new skills needs. Thus, a solid co-operation between VET suppliers and companies is required to better match skills needed by the industry and the supply throughout the working life cycle.

In the three scenarios a broader set of skills in all occupational functions and the ability to choose between the right ones by the individual worker is expected. Over the last years several reforms have taken place or have at least been planned to adapt IVET to the technology driven changes in the economy. Modularisation and greater flexibility is one possibility to adequately react on emerging skills needs. An alternative option presents the building up of joint training systems.

5) Support joint training networks to foster apprenticeships in the sector

Due to technological change and the development of different business niches, joint training networks between companies for job entrants (and also for mature workers) will become more important in the future. Regional based joint training networks between companies are one possibility to provide the comprehensive training job entrants need. The main purpose of joint training systems is that apprentices pass through all necessary stages of an apprenticeship, although the main training company can only provide some of these stages. Particular SMEs have continuing problems to dispense workers for training. Joint training networks are most applicable in regional centres of the sector where the density of companies is high. Regional and communal authorities can support the sector actors to build up such regional joint training networks.

6) Establish joint teaching facilities for all: keep vocational teaching up to date

Joint training facilities with the latest equipment available for initial vocational and further training can be built up in cooperation with training providers, social partners and the public authorities. To establish such training facilities the combined effort of sector organisations, component suppliers and public authorities is needed.

7) Develop e-learning and blended learning

A stronger use of e-learning also in apprenticeships could help to unburden SMEs in this respect. This is also a quite useful tool to support the training supervisors of apprentices in companies and provide latest information about developments in the sector. During the German reform of apprenticeships in the sector an e-learning platform was established with several features. The Dutch sectoral fund "Stichting Scholing en Werkgelegenheid Meubelindustrie" (Foundation for Schooling and Employment in the Furniture Industry) is another example where e-learning is going to be introduced. If they want, companies and schools have the possibility to use their platform to adjust and to add courses. Most useful of e-learning is the possibility of self directed learning which considers the limited resources for off the job training in SMEs and micro enterprises. Moreover, it offers more flexibility in time and place of learning, which can be a big advantage if training is difficult to combine with work schedules and/or home responsibilities.

8) Focus continuing vocational training on multi-skilling, re-training and up-skilling

According to earlier analysis in this study the production workforce is low skilled, ageing and mostly employed in SMEs. Employment numbers are expected to decrease in the future but also new skills are needed. This leads to several implications for the education and training system. Besides training the existing production workforce in emerging skills (and particularly in flexibility in applying new techniques, working with new materials and technologies and working with ICT and e-portals), and, due to a broader work scope, soft skills like communication, stress management, quality management and health and safety, there is also the necessity for up-skilling and even re-training in occupational functions like sales and marketing and business staff. For this reason certification of skills and knowledge obtained in the workplace should be recognized and skills assessments of skilled workers should be offered by training providers to optimize the re-placement of these workers (see also recognition of prior learning, section 7.1). To overcome skill shortages and gaps in the furniture production apprenticeships for adult unskilled labourers in binding and finishing

production are also conceivable to fill the vacancies and give insiders and also outsiders a new perspective.

Training, up-skilling and re-training support staff of the furniture sector for higher occupational functions such as sales is needed and also possible. Continuing vocational training is needed to prepare support staff for operating the emerging ancillary services. This includes general computer skills, operating digital CNC machines, databank management, marketing, customer care and sales knowledge, full logistic services, etc.

Multi-skilling will become more important also for occupations in the furniture sector. Business skills and project management skills will become more important in the future. This will also be the case for designers because of their strong role as information hub and their position at the interface between customer and production. The main challenge for education and training will be to provide suitable courses.

9) Establish joint continuing vocational training networks and special courses for older workers

To minimise costs in off-the-job vocational training for SMEs joint vocational training networks can be established between firms. Companies of the sector jointly decide about training needs and send their staff to jointly organised trainings offered by external training providers. This could help reduce training costs. In some countries (e.g. Austria) these training networks are supported by the public employment service, but only when they are specifically targeted at certain groups, e.g. the older workforce. Thus, this could be a model to train the ageing workforce of furniture production workers.

10) Facilitate training co-operations between SMEs

The prevalence of SMEs in the furniture sector makes co-operation for initial and continuing vocational training necessary. These co-operations should be supported by national training bodies and sectoral social partner organisations and supported by public funding. Existing models should be made public and good practice examples should be disseminated. Joint training networks should be used for apprenticeships but also for the training of the employees of the sector. In regional centres of the sector provincial or regional authorities can support the establishment of training co-operations.

11) Enhance transparency of the quality of training as well as improving the trans-national recognition of vocational qualifications

Due to the fact that a common certification system is still missing in the EU, vocational qualifications are not recognised in all countries. In addition training often takes place in form of non-standardised and not-certified courses, which limits the possibility to assess its quality and to include it in worker skills profiles. Difficulties in assessing workers' skills also occur when workers are recruited from other countries or sectors. The implications of the missing certification system are crucial. The setting up of a common certification system is a necessity in order to also make the quality of further training more transparent and to increase mobility of the workforce. Programmes to stimulate mobility as such (by short- and mid-term exchange programmes) might help in this respect. This sheds light on the need to make better use of existing European programs (e.g. Leonardo da Vinci) and of support made available by the Structural Funds (e.g. ESF).

12) Include interdisciplinary and multidisciplinary approaches in education

In vocational education and training more attention should be paid to inter- and multidisciplinary studies as different technical skills need to be combined with the required non-technical skills. Even though a sound technical education still provides the basis attention will have to be paid to enhance other skills such as project management, languages and competencies in business development. Such elements should also be an integral part of apprenticeship and traineeship programmes.

16 Main other conclusions and recommendations

16.1 Introduction

This report concludes with a number of 'other' (i.e. going beyond eduction and training) conclusions and recommendations based on the results and insights gained during the course of this study. They include the results of an intensive two day workshop with various stakeholders and the European Commission during which the draft final results, including preliminary recommendations, were discussed. The conclusions and recommendations apply to the sector at large (including individual firms, sector organisations, chambers of commerce, social partners), intermediary organisations, education and training institutes, as well as policy-makers (EU, Member States, regions).

The recommendations point into viable and useful directions rather than that they represent ready-made proposals for change. Reflection and debate, and finding creative answers to plausible futures in skills and jobs is, in the absence of a crystal ball, the way forward. The bandwidth between the expected developments in the most extreme scenarios is indicative for the degree of uncertainty by which the future should be approached. Solutions to future skills needs should therefore be flexible, smart and encompassing enough to address the differences between the various scenario outcomes, not knowing what real future will eventually emerge.

16.2 Main other recommendations

1) Improve the image of the sector

The expected skill shortages in the two transformation scenarios, the expected increase of the ICT and engineering professionals, of business and finance professionals, as well as the replacement demand for production workers, makes it necessary to improve the image of the furniture sector in schools to attract more labour in these occupational functions.

2) Career guidance for labour market entrants and employees

Career guidance can be used to pursue the following two objectives. First of all, it can help to redirect pupils and students to occupations where an increased demand is expected and to the sector in particular. Second, career guidance assists in supporting the placement of those

mature workers who are threatened by unemployment. In the sector scenarios, it is expected that lower skilled occupations like production workers and support staff as well as managers will decrease either by natural fluctuation or by layoffs.

Career guidance assists in finding new job possibilities within or outside the sector. In combining career guidance with skills assessments (e.g. potential analysis) as well as with the recognition of soft skills by companies, the scope for placements can be expanded for the employed as well as for labour market entrants.

Career guidance for pupils is undertaken in most countries by several different actors such as schools, training organisations, public employment services and related career information centres, trade unions, universities, sector organisations and companies. To enhance career guidance for pupils a solid regional co-ordination between these actors can be very effective as this helps in counselling and directing students into a profession suitable for them.

Regularly, persons equipped with required skills and qualifications are available but do not apply for vacancies due to the lack of information on the labour market possibilities. Career guidance and personal development for mature lower-skilled workers could be supported by an assessment of those skills which are not certified or documented so far. Systems for the recognition of prior learning (RPL) support the determination to what extent people possess necessary competences for a new job (Duarte 2004). The integration of RPL in career guidance and targeted training bridges the gap of hidden competences especially for mature workers. Some Member States have included RPL in their system. In Portugal, for instance, a national system of Recognising, Validating and Certifying Prior Learning is implemented through a network of centres. Adults, whether employed or unemployed, are offered a three-tiered service, namely information, counselling and complementary training, including the accreditation of competences (OECD/European Communities, 2004, p. 31). The centres are supported by the Ministry of Education and are run by training organisations or universities. The certification and validation of skills is undertaken by a jury with an external evaluator.

Another conceivable option is co-operation between companies, sector representatives, training institutes and external human resource counsellors, especially to further develop or up-skill the lower skilled workforce of SMEs in the sector. One of the implications of the scenarios is that there will be less demand for support staff and production workers in the future. In order to prevent skill gaps in other occupations within the sector and to prevent unemployment of these workers, career management by way of such networked co-operation could be helpful. This kind of human resource development could especially be led by training institutions, yet jointly implemented with the other actors. Especially for the small companies in the furniture sector this could be a possibility to develop their human resource management.

3) Improve co-operation to improve information regarding skills needs and job opportunities

Close collaboration between all relevant stakeholders, companies, education and training organisations, social partners, research institutions and public authorities, will help to reduce information deficits on current and emerging skills needs. The traditional training system has to adapt to the new situation and collaboration is an effective instrument to stimulate the implementation of changes in VET. A strong linkage between industry and education and training is recommended in full-time, school-based VET systems that are state-driven (Koch and Reuling, 1998). In all countries and, in particular, in the new Member States, co-

operation is essential to improve the practical orientation in VET (Skjølstrup and Mayen, 2007).

4) Intensify collaboration between all stakeholders

A principal recommendation to meet emerging skills needs is to intensify cooperation between all relevant stakeholders in the sector. The challenge to overcome sectoral skill gaps will be met if industry, training providers, social partners, research and public authorities act in concert. This was demonstrated in section seven. A collaboration is not only required to meet skills needs, but also to support the development of sectoral learning strategies and the establishment of partnerships for innovation and job creation.

Enhanced investment in human capital is required. Cost sharing mechanisms between actors such as public authorities, companies and individuals need to be developed and life-long learning (LLL) throughout the life cycle should be promoted. Learning must be made more attractive to all, e.g. via tax incentives or a change of attitudes in order to integrate learning into all phases of life and to incorporate a lifecycle approach to work. In addition, the training and education systems in the Member States need to be improved to cope with more modular based needs for VET to cover knowledge shortages and up-skilling needs, as already stated in the above implications for education and training.

Life-long learning is the key to keep up with competitiveness and to prevent less favourable scenarios. Governments should further develop the legal framework for supporting life long learning at all ages. Social partners should develop joint programs of lifelong learning in cooperation with public authorities and other relevant stakeholders such as training organisations and universities in order to up-grade skills of the workforce in the sector. The programs should be tailored to the specific needs of SMEs in the sector. Life-long learning should encompass all skills levels aiming at raising basic social skills as well as technical sector skills. All available international, national and regional and local pathways should be used to finance lifelong learning.

5) Keep older workers longer in employment

Like most industries, the furnishing sector is confronted with an ageing workforce. To keep the knowledge and the experience of older workers available and to avoid skill gaps, special part time retirement schemes should be developed by the responsible authorities and applied by the companies. Additionally, further training of older workers in SMEs should be supported by public authorities.

6) Review and monitor the role of new technologies and their implications for employment in the furniture sector

The degree of automation will increase throughout the industry, in all scenarios. In the *global mass production* scenario automation will play a bigger role than in the *local and global customisation* scenarios, but the application of advanced machines, robots, and prototypers will increase until 2020

As present the furniture industry lags behind in regard to the latest automation technology and it will probably remain a lagging sector until 2020 as robotics is seen by as still too costly to apply in the furniture sector. Hence machines capable of self-diagnosis and self-maintenance as well as maintenance-robots will probably not be deployed routinely in the

furniture industry by 2020. This will lead to an increase in the need for machine maintenance and repair workers. However, they will more likely be provided by the producers of the machines rather than employed by the users of the machines (i.e., the furniture industry).

Ongoing technological change will lead to profound changes in business strategies and job functions. The need for handicraft workers and labourers will decrease in general and the need for knowledge-based workers will most probably increase (managers, designers, supply chain managers).

Mass customisation (both in the local and global scenarios) in combination with technological advancement will lead to a more customer-driven production process. Customers will probably be enabled to co-design their own furniture online, which will require the development of sophisticated and interactive websites. After completing the design, the product will go into production, which could be fully automated. This way of selling products requires different technical skills and e-skills from practically every job function, from managers to marketing and sales and from industrial designers to labourers.

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Annex I. Contributors to this study

This report appears in a series of 11 sector reports on the future jobs and skills commissioned by the European Commission and executed by a core consortium of TNO (Delft/Leiden, the Netherlands), SEOR Erasmus University (Rotterdam, the Netherlands) and ZSI - Zentrum für Soziale Innovation (Vienna, Austria). The consortium was led by Dr F.A. van der Zee (TNO Innovation Policy group; TNO Innovation & Environment).

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Annex III. Strategic options – a detailed description

A. Recruiting workers from other sectors

A possible solution to meet skill needs is to recruit workers from other sectors, which have and can provide the skills and knowledge needs of the sector and more specifically the firm. Whether or not this is a desirable option depends, amongst others, on the job function under consideration. For managers of large corporations it is quite usual to bring their general know-how to bear in different sectors. Also for business professionals (e.g. financial analysts, software engineers) sector specificities are of lesser importance. Sector mobility of low skilled workers is much more limited than the mobility of higher educated employees. The lesser the grade of sector specialisation of the occupational profile, the easier employees are able to change between sectors. In other cases recruiting workers from other sectors will need training of sector specific skills. In some cases it will also be possible for highly specialised workers to change sectors.

B. Recruiting workers from other Member States

Recruiting workers from other Member States could be in some cases a possibility to overcome skills problems. However, owing to language, cultural and other problems, including certain entrance barriers left to the Member States, mobility within the European Union is still underdeveloped. Border regions are attracting workers from other countries mainly because of wage advantages and in this way can succeed in solving their skills shortages and gaps. However, regions that face such outward migration (e.g. Poland, East Germany, Parts of Austria, Hungary, Czech Republic, Slovenia, Bulgaria) at the same time face serious problems in meeting their labour market demands. Some have responded by recruiting workers from non-Member States. Even if this might appear a temporary problem, from a longer term perspective, such developments could have serious consequences for the growth of the regional economy – in what might be termed a 'skills drain' (cf. 'brain drain").

C. Recruiting workers from non-Member States

Recruiting workers from non-Member States is not a zero-sum game for the European economy. Yet this strategic choice is as limited in its overall impact as the strategic choice that proposes to recruit workers from other Member States. On top of this, such recruitment is much more difficult that recruitment from within the EU. In all Member States significant barriers for entering the labour market for workers from outside the EU exist, even for temporary workers. To increase the influx of these workers by, e.g. increasing the immigration quota several political hurdles have to be mastered. Action can be taken here at Member State as well as at EU level, the recent 'blue card' proposal and negotiations serving as an example.

D. Recruiting unemployed workers with or without training

Recruiting unemployed workers without training is a strategic option, especially in case of skill shortages if there are not enough skilled workers to meet the employers demand). This option should in these cases be combined with adequate training. Unemployed workers might have various placement handicaps, especially skills deficits and poor levels of basic qualifications. Low educated groups are still representing the majority of the unemployed labour force, but also highly skilled workers like engineers could be threatened by unemployment.

E. Recruiting young people coming from the education system, with or without re-training

This strategic choice is always a possibility to overcome skill shortages as well as skill gaps. But demographic change should be taken into account too. While in the next few years, until around 2015, there will be a continuous inflow of students entering the labour market, a significant reduction is expected in 2020. In some EU regions there is already a need for young qualified and skilled workers and apprentices. Even where sectors may pay relatively high wages and offer stable carrier prospects, it is not easy to attract enough labour in critical occupational functions. While in the last years labour in business and finance professionals as well as administrative staff and customer services could be attracted the situation in technical occupations (engineers/technicians, construction workers, plant operators) is still critical. Hence, the recruiting of young people can only be successful, if this measure is supported with the other strategic options such as "Improving the image of the sector" and "Stronger cooperation within the industry". To be more precise, a stronger cooperation between schools, university, training organisations, career managers on the one hand and the industry on the other is needed. The principal aim should be to overcome the mismatch of requirements and wishes of individuals on the one hand and the economy on the other.

F. Training employed workers

In some cases training and re-training could also constitute a strategic choice to meet skill demands. In this case, the employee will be trained for a new working place or task. In general, re-training ends with a formal graduation or certificate. Re-training is an option if the work place or the occupational function is not needed any more. But re-training is only one option. Further education or further training, refresher training and updating courses, or advanced vocational qualification to adapt the workforce to emergent skills needs are also options, which should be taken into account. Re-training or further training of employees can encompass all levels of skills. Training and qualification could be done in-house and on the job as well as by an external education institution. It is more likely that less fundamental variations of up-skilling or re-training will be a strategic choice because re-training has to be regarded as a long term and quite expensive measure compared to the other vocational education forms.

G. Changing the work organisation

Work organisation can be defined in different ways. First, it can be defined as a system of work organisation (e.g. Taylorims, Fordism and Post-Fordism) and second, as a form of division of labour and specialisation. In modern economies productivity is based on the division of labour which by definition implies also a division of skills. There are several instruments of work organisation to react on skill shortages and gaps. Thus, changes in the

work organisation can help to overcome skill gaps. In general, work can be reorganised in the following possible ways:

- Group work: A group is a limited number of people who work together over a longer period with a frequent, direct interaction. A group is defined through the differentiation of roles and joint values. Groups are able to produce better results than single persons due to the combination of different competencies and experiences, the reduction of wrong decisions, stronger work motivation, the direct use of information, new insights and creativity and a better acceptance of decisions, just to mention a few of the many advantages. There are several kinds of group work, like project groups, quality groups and learning circles, as well as committees.
- Job rotation: Within this type of work organisation several people change their work places in a planned alteration. Job rotation enhances the overview of the different production processes, the understanding of different tasks and the feeling for group work. Additionally, monotony and dissatisfaction are reduced.
- Job enlargement: Extension of the scope of work through the combination of several structurally equal or similar tasks. It can produce similar effects as job rotation.
- Job enrichment: Extension of the scope of work through the combination of several structurally different tasks. The scope of decision making and self-control increases, as well as the quality and quantity of work. In general, up skilling of the employee is necessary, but this is also implemented on the job.

Under the influence of new technologies, like information and communication technologies, virtual forms of work organisation, which substitute hierarchies through a horizontal network co-ordination, are also possible. In this sense, mergers and acquisitions as well as project based business colloboration are also available options to change the work organisation. Both measures are strategic possibilities to get access to needed resources or to incorporate new skills. Modern (communication) technology can support the co-ordination and co-operation of labourers working at different places and in combining their respective strengths.

H. Outsourcing and offshoring

In public discussion the terms outsourcing and offshoring are mainly used together, yet it must be emphasised that they describe different technical approaches. While outsourcing means the transfer of management or day-to-day execution of business functions or processes (production, manufacturing, services) to an external service provider, offshoring describes the relocation of business functions or processes from one country to another. Both could be applied as a strategic choice on company level to meet skill needs, by integrating the knowledge, experience and competences of the other firm in the production process.

Outsourcing of personnel as a result of technological change and economic pressure was and still is an ongoing trend. Due to de-regulation and privatisation several tasks and with it skills and competences in the sector were outsourced and in some countries dislocated to other countries to increase labour productivity. Several occupational functions in the production chain have been outsourced nowadays. Skill gaps can be closed by hiring subcontractors with the needed knowledge and competences. If one considers this strategic option to meet skill needs, it has to be taken into account that for subcontracting firms, freelance or contractual workers continuing vocational training often plays a marginal role, because employees are all too often indispensible. One should also bear in mind that freelancers are not available at any

time and in unlimited numbers. Outsourcing and offshoring is therefore a limited strategic option to overcome skill gaps. It seems to be more adequate to overcome skill shortages.

I. Changing vocational education

Changing vocational education has a long-term effect. It must be taken into account that changes will have a substantial impact in quality and quantity starting at the earliest within three years time after the changes. The process of changing initial vocational education in content or in structure takes itself several years. The process from defining the needs and problems to the implementation of a new curriculum involves several stakeholders from different expert levels like companies, social partner organisations, training institutes as well as representatives of national and regional education administration. These bargaining processes could take several years and are dependent of the VET-system of the European Member State. Hence, this strategic choice will only be drawn if major structural changes are expected.

Despite these facts, possible changes can be seen in a stronger modularisation of curricula of initial vocational training as well as in building up or strengthening interplant and interregional training infrastructure. The first option could in the long run help to overcome identified skill needs in a sound, flexible and a relatively quick way. The second option is amongst others a possibility to provide the latest high-value equipment for training quickly by sharing resources of several partners.

J. Designing and offering new courses (continuing vocational education and training)

Once it is clear that the current content of vocational training is not up to date and therefore does not address the demands, the development of new courses for continuing vocational education and training could be a strategic option with a short term impact (see also *M. Stronger cooperation between stakeholders).*

K. Providing information about jobs and (emerging) skills

There is still a lack of transparency concerning current and emerging skill needs and job opportunities in different economic sectors. Information systems on regional, sectoral, national or European level could help to minimise information asymmetries and in that way overcome skill gaps resulting from information deficits. As a consequence, it could prove highly effective in helping students to enter the labour market and find a suitable occupation, just as much as in assisting employees to find new job opportunities based on existing skills or guide them in finding the suitable vocational training course.

Career guidance impacts rather short term. Therefore, it can help to overcome the mismatch between the needs and interest of the individual and those of the prevailing economy. The basic assumption of this strategic choice is that there already exist people who are equipped with the required skills and qualifications, but, due to a lack of information about the labour market possibilities, do not apply for these jobs. Career guidance for students and employees can help to overcome this mismatch. In this respect there can be a clear connection to training. Systems for recognition of prior learning (RPL) can help to determine to what extent people possess necessary competences for a new job. Targeted training can bridge the gap for the failing competences.

L. Improving the image of the sector

Improving the image of the sector could be an easy and suitable measure especially to overcome skill and labour market shortages and attract new employees. Several instruments could be implemented by sector organisations in co-operation with different non sector actors like schools, career management organisations, training organisation, public employment services, and public administration. Instruments could be company visits for pupils, offering internships for pupils and enhanced public relation. Especially in sectors where framework conditions and occupational functions changed fundamentally, due to technological or organisational restructuring or low wage levels, this offers a possibility to overcome stereotypes as much as old fashioned views and to attract more labour. Moreover, this measure does not only provide a chance to overcome stereotypes in relation to the sector but also to some occupational functions. The effect of this strategic option is long-term. In consideration of the apprenticeship system, which can take up five to seven years (if the specialisation of high qualified jobs in the sector is taken into account) until the volume effect is reached, one must arrive at the conclusion that in some occupational functions it has to be initiated right now.

M. Stronger cooperation with the industry

A stronger co-operation between industry and training institutes on a regular basis is one possibility to meet the skill needs in the sector. In some sectors and countries training of employees does not seem to be in line with the industry's emerging needs. New training and teaching solutions are to be developed between the industry, sector representatives, education institutions and research centres, public bodies, etc. Information exchange and a stable cooperation between the relevant stakeholders could improve the matching of training needs and demands. In the long run it will enhance the efficiency of training output, strengthen the quality of training and maximize the individual potential. To build up this kind of cooperation takes time, but in the long run it might well be capable to provide accurate solutions for problems. Networks and partnerships between these stakeholders to forecast skill needs in the sectors also present a long term measure. They could help to define emergent skill needs. While knowledge about the development of skill supply is quite high, the knowledge about the development of skill demand in different sectors is still improvable. These kinds of networks can cooperatively detect the need for action and contribute to the development of recommendation of actions.

Glossary

Apprenticeship. Systematic, long-term training alternating periods at the workplace and in an educational institution or training centre. The apprentice is contractually linked to the employer and receives remuneration (wage or allowance). The employer assumes responsibility for providing the trainee with training leading to a specific occupation. (Cedefop, 2004)

Competence. Competence refers to the proven ability to use knowledge, skills and personal, social and/ or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy;

Compulsory education. The minimal legal standards and duration of obligatory schooling. (ILO, 1998)

Concentration index. The concentration index assesses the relative contribution of a specific sector to the national economy compared to a greater entity, such as the EU, thereby correcting for the size of the country. In more general terms, the concentration index is a measure of comparative advantage, with changes over time revealing changes in the production structure of a country. An increase of the concentration index for a sector signifies relatively fast growth of that particular sector in the country concerned compared to the same sector in the EU. How does the concentration index work in practice? A few (hypothetical) examples: if sector x represents a 5% share of the German economy and a 5% share of the EU economy, the concentration index of sector x equals a 100. If sector x represents 5% of the German economy, but 10% of the EU economy, the concentration index of sector x is 50. If the same sector x represents 10% of the German economy and 5% of the EU economy, the concentration index of sector x is 200.

The concentration index concept can be applied using different indicators (variables). In our study we measure the concentration index using employment, value added and trade, in order to make a distinction between the relative performance of countries EU-wide. We distinguish between four country groupings, each signifying a different sector performance over time. If a sector in a country has a strong position (hence showing a concentration index higher than 100) and has experienced a clear index growth over the last years, the sector is defined as winning in that country. If the sector has a strong position, but experienced a decline of the concentration index, we say the sector is losing momentum. If the sector has a weak position, but gained in the past, we say that the sector in that country is upcoming. If the sector has a weak position and experienced a decline of the index, we say that the sector is retreating.

Employability. The degree of adaptability an individual demonstrates in finding and keeping a job, and updating occupational competences. (Cedefop, 2000)

European Credit system for Vocational Education and Training (ECVET). A device in which qualifications are expressed in units of learning outcomes to which credit points are attached, and which is combined with a procedure for validating learning outcomes. The aim of this system is to promote:

- mobility of people undertaking training;
- accumulation, transfer and validation and recognition of learning outcomes (either formal, non-formal or informal) acquired in different countries;
- implementation of lifelong learning;
- transparency of qualifications;

- mutual trust and cooperation between vocational training and education providers in Europe. (Cedefop)

European Qualification Framework for life-long learning (EQF). A reference tool for the description and comparison of qualifi cation levels in qualifi cations systems developed at national, international or sectoral level. (Cedefop)

Full-time Employment. Traditionally means a 'regular job'. Work that is about eight hours a day, five days a week and forty-eight weeks of the year with four weeks paid leave.

Informal learning. Learning resulting from daily activities related to work, family or leisure. It is not organised or structured in terms of objectives, time or learning support. Informal learning is in most cases unintentional from the learner's perspective. (Cedefop, 2008)

Interdisciplinary (multidisciplinary). Interdisciplinary refers to research or study that integrates concepts from different disciplines resulting in a synthesised or co-ordinated coherent whole. New disciplines have arisen as a result of such syntheses. For instance, quantum information processing amalgamates elements of quantum physics and computer science. Bioinformatics combines molecular biology with computer science. An interdisciplinary team is a team of people with training in different fields. Interdisciplinary teams are common in complex environments such as health care.

Job mobility. Any change of job, regardless of where the new job is located.

Knowledge. Knowledge refers to the outcome of the accumulation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual.

Knowledge society. A society whose processes and practices are based on the production, distribution and use of knowledge. (Cedefop, 2008)

Learning outcomes. Learning outcomes refer to statements of what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and competence.

Lifelong learning. All learning activity undertaken throughout life, with the aim of improving knowledge, skills/competences and/or qualifications for personal, social and/or professional reasons. (Cedefop, 2008)

Low, medium, high educated. See also under qualifications. The Labour Force Survey (LFS) collects data for a number of characteristics of employees, one being the level of education of an employee. The LFS is is based on the ISCED 1997 classification (International Standard Classification of Education).

- Low-educated encloses all levels up to the compulsory education (ISCED 1+2). ISCED 1: primary education or first stage of basic education. ISCED 2: lower secondary education or second stage of basic education.
- Medium-educated comprises all the post compulsory education not tertiary (ISCED 3+4). ISCED 3: (upper) secondary education. ISCED 4: post-secondary non tertiary education
- High-educated comprises all tertiary education including university education (ISCED 5+6). ISCED 5: first stage of tertiary education). ISCED 6: second stage of tertiary education (leading to an advanced research qualification).

Low, medium, high skilled. In general this classification refers to the skills required for a specific occupation that an employee currently holds. In existing taxonomies skills levels are usually proxied by educational attainment (see low, medium, high educated).

Mobility, see job mobility.

Multi-skilling. Multi-skilling refers to training an employee to cover a range of different jobs in one workplace. A multiskilled worker is an individual who possesses or acquires a range of skills and knowledge and applies them to work tasks that may fall outside the traditional boundaries of his or her original training. This does not necessarily mean that a worker obtains or possesses high-level skills in multiple technology areas. However, the worker can be an effective and productive contributor to the work output of several traditional training disciplines.

Multi-tasking. The ability of a person to perform more than one task at the same time.

Profession. An occupation which requires knowledge gained through academic study, such as law, medicine or teaching.

Qualification. Qualification refers to a formal outcome of an assessment and validation process which is obtained hen a competent body determines that an individual has achieved learning outcomes to given standards.

Qualifications, Comparability of -. The extent to which it is possible to establish equivalence between the level and content of qualifications (certificates, diplomas or titles) at sectoral, regional, national or international levels. (Cedefop, 2000)

Qualification, level of -. Low: at most lower secondary (ISCED 0-2); medium: upper secondary (ISCED 3-4); high: Tertiary (ISCED 5-6).

Qualification framework. An instrument for the development and classification of qualifications (e.g. at national or sectoral level) according to a set of criteria (e.g. using descriptors) applicable to specified levels of learning outcomes. (OECD, 2007)

Retraining. Training enabling individuals to acquire new skills giving access either to a new occupation or to new professional activities. (Cedefop, 2004)

Revealed Comparative Advantage (RCA). Relative comparative advantage compares the relative contribution of sector x to the comparative advantage of the national economy with other sectors. It is calculated as follows:

RCA = tanh (ln ((Exports S / Imports S) / (Exports C / Imports C))) x 100

Interpretation: 0 = the comparative advantage of sector x equals the average of the comparative advantage of the entire national economy. Near -100: the sector contributes nothing to the comparative advantage of that country. Near + 100: the sector contributes strongly to the comparative advantage of the country.

The use and logic of the country groupings winning, losing momentum, upcoming and retreating in combination with revealed comparative advantage is similar to the concentration index (see above).

Skills. Skills refer to the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).

Skills gaps. Skills gaps arise where an employee does not fully meet the skills requirements for a specific job function but is nevertheless hired. This skills gap needs to be closed through training. Skills gaps can arise where new entrants to the labour market are hired and although apparently trained and qualified for occupations still lack some of the skills required.

Skills needs, emergent -. Emergent skills needs are defined in this study as the change in skills that is needed to adequately fulfil a certain job function in the future. Addressing emergent skills is needed in order to avoid skills shortages and/or skills gaps in the future.

Skills shortages. Skills shortages exist where there is a genuine lack of adequately skilled individuals available in the accessible labour market. A skill shortage arises when an employer has a vacancy that is hard-to-fill because applicants lack the necessary skills, qualifications or experience.

Tertiary education. Tertiary education refers, in most settings to non-compulsory education provided via a specialist institution once secondary schooling is completed, usually labelled as a college, polytechnic or university (in English) with variants of these in other languages. Tertiary education may be delivered virtually or at a distance.

Trade balance. Exports minus imports.

Training. The development of skills or knowledge through instruction or practice; a kind of vocational learning such as an apprenticeship or traineeship which includes both formal education and on-the-job experience.

Unskilled work. Work which lacks specialist training or ability and generally involves simple manual operations which can be learned in a short time.

Up-skilling. Short-term targeted training typically provided following initial education or training, and aimed at supplementing, improving or updating knowledge, skills and/or competences acquired during previous training. (Cedefop, 2004)

Vocational Education and Training (VET). Education and training which aims to equip people with skills and competences that can be used on the labour market. (adapted from ETF, 1997).